STEEL
The Metalworking Weekly
A PENTON PUBLICATION
JANUARY 30, 1961

Frank Pace Jr., chairman, General Dynamics Corp., finds his assistant, Allen Siebens (right), a valuable asset in conducting daily affairs . . .

Assistants to: What's Their Role? . . 64

PROGRAM FOR MANAGEMENT Profit Micromargins Thwart Growth . . 71

How to Select Superalloy Springs . . 96

Line Pipe Sales Outlook Brightens . . 129

METALWORKING WEEK—PAGE 17
COMPLETE CONTENTS—PAGE 19

FOR MAXIMUM SERVICE SPECIFY

B&W *Job-Matched Lectrosonic hydraulic line tubing*

B&W offers you:

- an electric-resistance-welded carbon steel hydraulic line tube manufactured to JIC standards under a rigid system of quality control
- a full range of tube sizes to match your hydraulic application requirements
- a hydraulic line tube that costs far less than seamless in comparable sizes

B&W Job-Matched LECTROSONIC Hydraulic Line Tubing is available through a nationwide network of district sales offices and steel service centers. And remember — matching tubes to jobs assures you the *right tube,* in the *right quantity,* at the *right time.* For more information, call your local B&W District Sales Office, or write for Bulletin T-435. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA-9051-WM 1

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

Re-designed as a drop forging, this dual-wheel tail caster for a Navy combat plane has not been known to fail in service, in spite of the crushing impact it must absorb during landings.

Steel

for strength
. . . economy
. . . versatility

IT'S FORGED IN STEEL

. . . for forged-in strength!

This critical part used to be fabricated. Five separate pieces welded together. Expensive. Hard to inspect. Lots of machining.

Then a forger designed it as a drop forging. Besides cutting manufacturing costs, the improved design made a much stronger part. The forging was easier to inspect, as well.

Forging design—key to low-cost, long-service parts

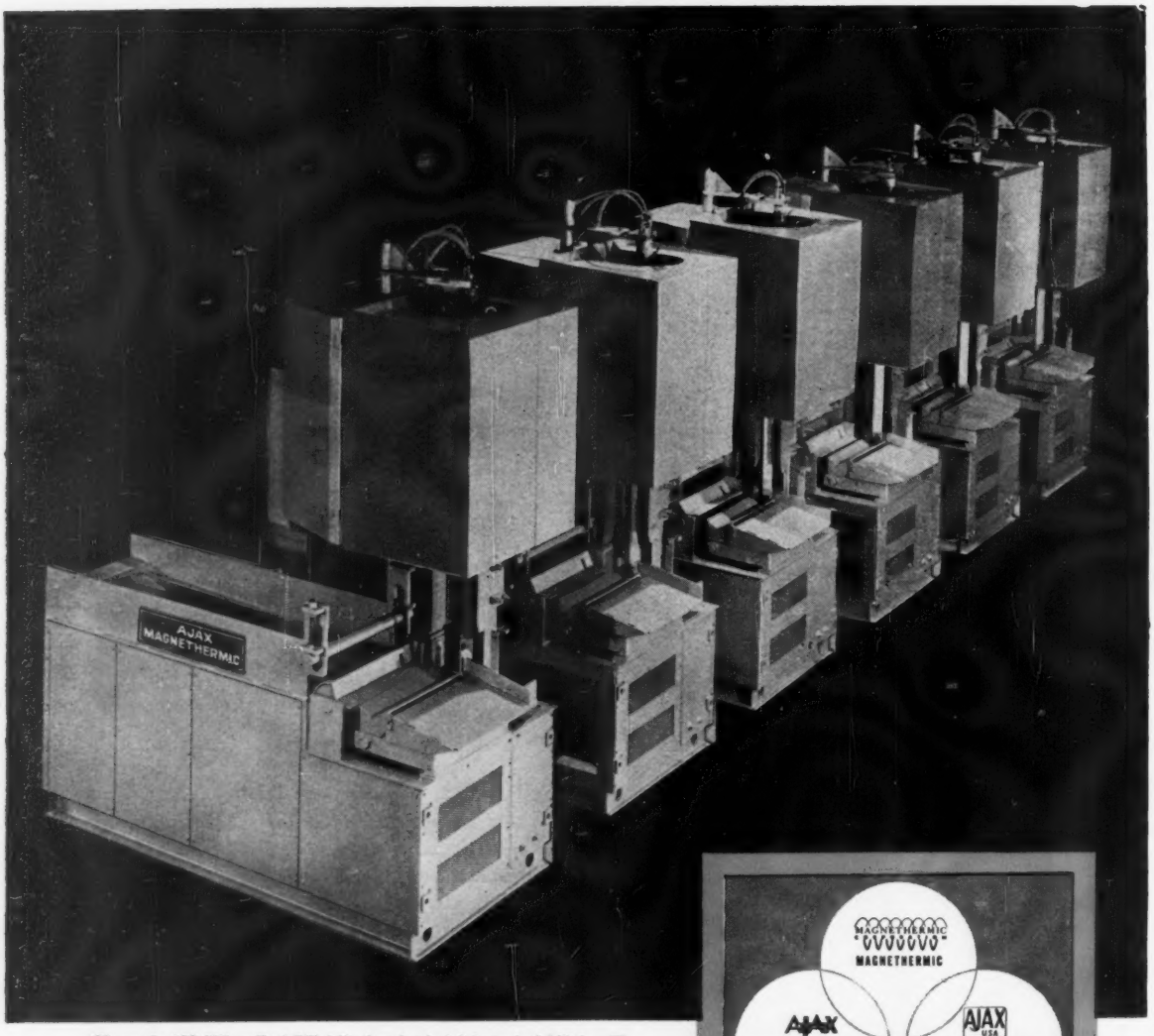
With the modern techniques and modern steels available to the forgings engineer, he is able to translate almost any parts problem into a practical forging design. If you require less weight and more strength, lower cost and longer life, faster production and improved performance for the parts you manufacture, look for the answer in a drop forging.

No one knows better than the forger that *the quality of the steel is a forging's most important ingredient.* That's why so many forgers use Bethlehem steels—carbon and alloy grades they can always depend on to satisfy their customers' requirements. You'll find you can depend on them, too.

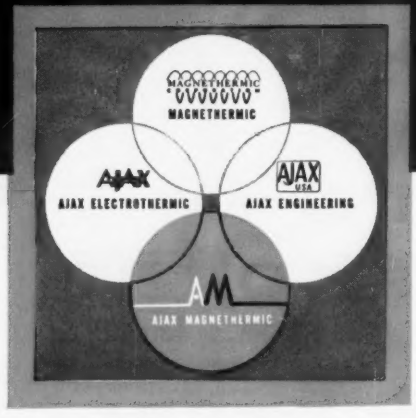
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



These six 400 KW vertical Billet Heaters heat stainless steel billets—5" —10" dia. x 28" long, to 2300° F at the rate of 12,000 lbs. per hour.



WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

Vertical Steel Billet Heaters, one of many products of AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

AJAX Magnethermic CORPORATION

GENERAL OFFICES
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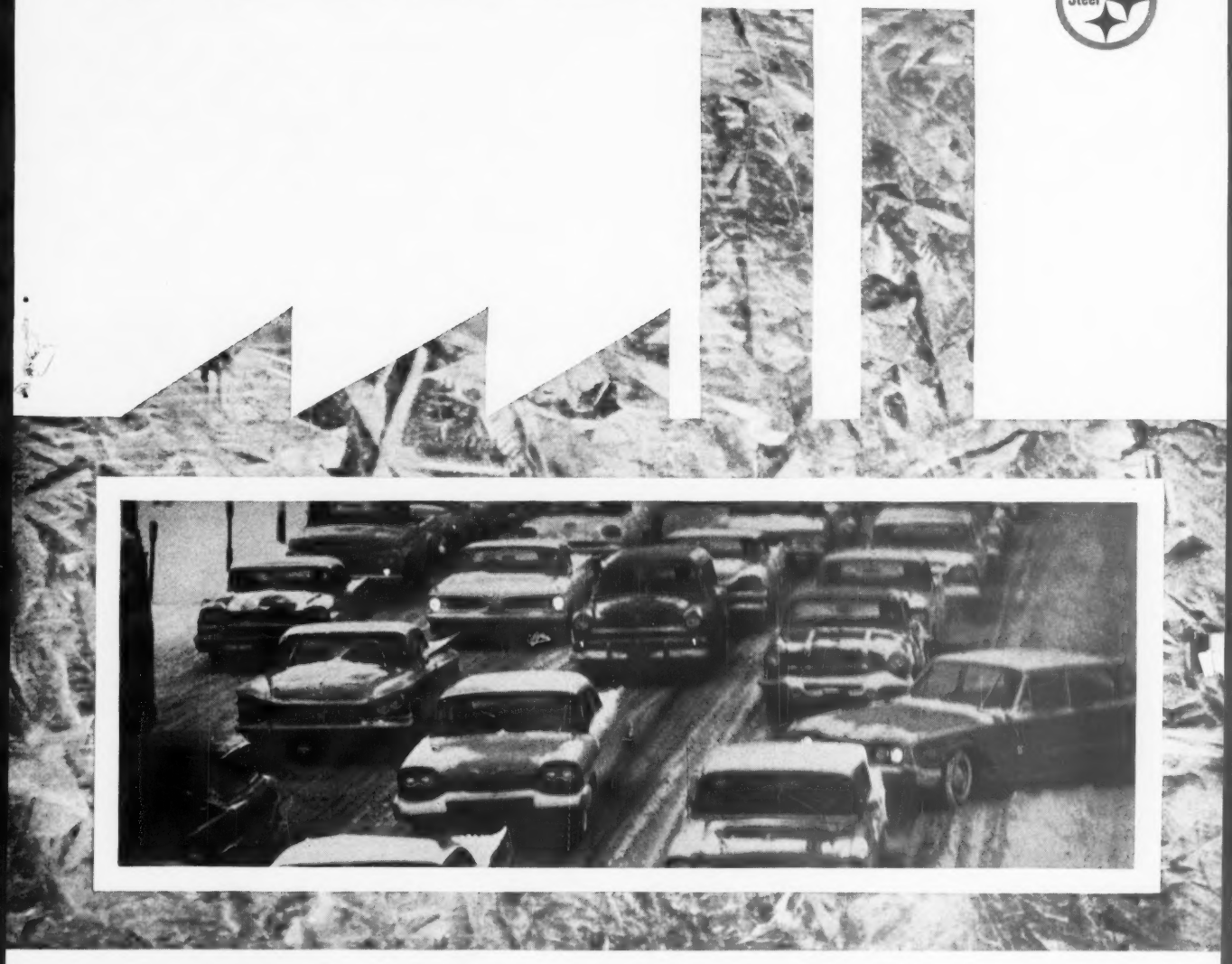
Youngstown 1, Ohio

The new generation of U.S. autos fends off corrosion . . .



GUARDED BY GALVANIZED STEEL

Use of galvanized steel sheets in the automotive industry has increased by more than 700% since 1954—and more automotive applications are on the way.

As a result of this growing addition to Detroit's diet, both consumers and manufacturers are benefiting. To car owners, every pound of galvanized steel means more complete corrosion protection, added durability and savings in maintenance. To manufacturers, galvanized steel's simplified fabricating procedures bring reduced costs. Head and tail lamp housings, for instance, formerly required five or six steps when zinc plated or painted after stamping. Now they are moved direct from press to assembly line with their tight zinc coatings completely undamaged by fabrication. This also applies to side members, rocker panels, front and rear rails and cross members.

WEIRKOTE, IN PARTICULAR! One of the leading galvanized steels, Weirkote is widely used in the latest model automobiles. To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection via the modern continuous process. As a result, it can be worked to the very limits of the steel base without chipping or peeling. And it assures you long-lasting protection against corrosion. It is manufactured by two National Steel divisions, Weirton Steel Company and Midwest Steel Corporation. Write Weirton Steel Company, Weirton, West Virginia, for further Weirkote details.

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WEIRTON STEEL
Weirton, West Virginia

divisions of
NATIONAL STEEL CORPORATION

The quick setup
of WARNER & SWASEY
Multi-Spindle
Automatics
cuts costs in
small lot shops...
on a wide range of
complex, accurate jobs
in tough materials

Sound the Trumpets

The gentleman at the left in the photo, W. T. Kaarlela, received STEEL's November Usership award from Editor-in-Chief Irwin H. Such (center), as J. C. Herr looked on.

Mr. Kaarlela, a metallurgist for Convair Div. of General Dynamics Corp. at Ft. Worth, Tex., earned the plaque, a check for $500, and the title of Honorary Editor No. 16, for making use of a STEEL article—testing for loss of surface carbon in steel (Nov. 28, 1960, p. 118). The presentation was made at a meeting of the Ft. Worth-Dallas chapter of the American Society for Metals. Mr. Herr is vice chairman of the group, as well as chief metallurgist at Convair.

The Judges Selected . . .

. . . . eleven Honorable Mention winners who collected engraved desk lighters as prizes:

Paul Barth, senior process engineer, Mueller Brass Co., Port Huron, Mich.; J. P. Berkeley, president, Berkeley-Davis Inc., Danville, Ill.; Leon Eriv, metallurgist, Research & Technical Dept., Technical Service Div., Eastern Laboratory, Canco Div., American Can Co., Newark, N. J.; Donald C. J. Gray, factory manager, Hastings Equity Grain Bin Mfg. Co., Hastings, Nebr.; H. G. Knecht, vice president-manufacturing, Stran-Steel Corp., Terre Haute, Ind.; Martin Perl, chief metallurgist, Superweld Corp., North Hollywood, Calif.; Frank Slater, marketing analyst, Electrical Products Div., Minnesota Mining & Mfg. Co., St. Paul; Victor Stein, chief engineer, Potentiometer Div., DeJur-Amsco Corp., Long Island City, N. Y.; H. W. Wehe Jr., executive vice president, Overly Mfg. Co., Greensburg, Pa.; Toshio Yamasaki, senior, tool and manufacturing engineering, Utah State University, Logan, Utah; Allan M. Young, engineer, Electrical Valve Div., Allied Control Co. Inc., Plantsville, Conn.

To Meeting We Will Go

STEEL's 34 editors will be off by plane, train, and auto to cover more than 100 metalworking meetings for you in 1961, but we regret that we find no coverage planned for these fine groups:

National Society of New England Women.

National Flying Farmers' Association.

International Concatenated Order of Hoo Hoo.

Memo on Memorandums

Editor Walt Campbell has received a deskful of mail concerning his Dec. 26 editorial on unnecessary correspondence.

The solution we like best is suggested by C. B. Warren, assistant advertising manager for machine tools at Norton Co., Worcester, Mass. To reduce the length and number of memos and letters he writes, he types them all himself on short forms or small paper.

Coming Attractions

Geraldine, our cleaning woman and vigilant night editor, asks us to remind you that the Facts & Figures Section for 1961 will appear Mar. 27.

We formerly carried it in our annual issue at the first of each year, but the editors decided that later publication would permit inclusion of most 12-month figures for the latest year.

She also points out an attraction in this issue. Turn as fast as you can to Page 71.

It's the second installment in our 1961 Program for Management. It shows why and how our profit margins have become micromargins. The author: Associate Editor George Howick.

One Day Left . . .

. . . to enter STEEL's Usership Idea of the Month Contest. Deadline for the final contest (December) is Feb. 1, 1961. For rules, see the Servicenter, Page 5, in any December issue. You might win $1000.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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CHATTANOOGA 2, TENN.

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to give up a few hours a year for a health checkup?

Your best cancer insurance is a thorough checkup every year, and alertness to Cancer's 7 Danger Signals.

Learn how to guard yourself against cancer. Write to "Cancer" in care of your local post office, or call your nearest office of...

American Cancer Society

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Barrel finishing is best finishing

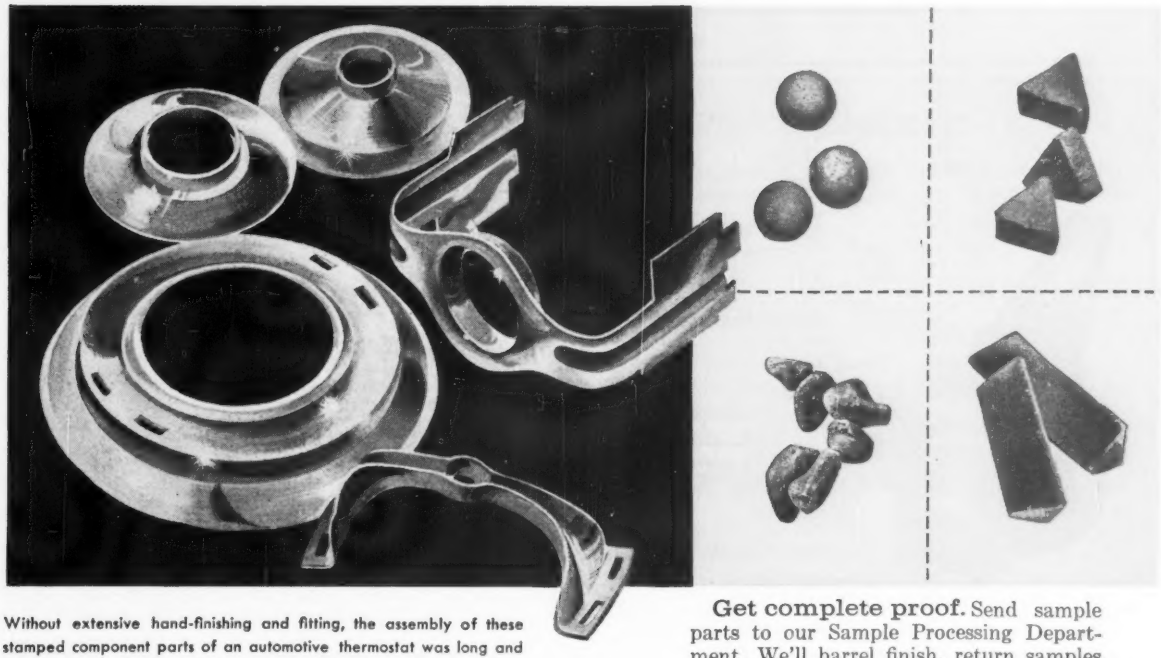
. . . to cut your assembling costs

Assembling finished parts is no longer the money-wasting problem it used to be.

Barrel finishing with Norton TUMBLEX abrasives is your modern solution . . . your surest, quickest way to remove burrs, heat scale, sharp or rough edges and other surface imperfections that keep complicated parts from fitting together smoothly and accurately.

We say *your* solution because the scope of TUMBLEX abrasives is virtually unlimited. The parts you finish . . . for assembling or for any other purpose . . . can be of any metal, ferrous or non-ferrous . . . or non-metallic including plastics and even woods . . . as hard as sintered oxides or soft as the softest machinable material . . . and their sizes can range from miniature to massive.

Barrel finishing with the right TUMBLEX abrasive not only improves your product appearance and quality — its speed and simplicity can increase your man-hour productivity and cut your cost-per-piece produced.



Without extensive hand-finishing and fitting, the assembly of these stamped component parts of an automotive thermostat was long and difficult. Barrel finishing with Norton TUMBLEX* abrasive proved unequalled for removing burrs that brought new speed to assembling.

Get complete proof. Send sample parts to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need for new production advantages. NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

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G-407

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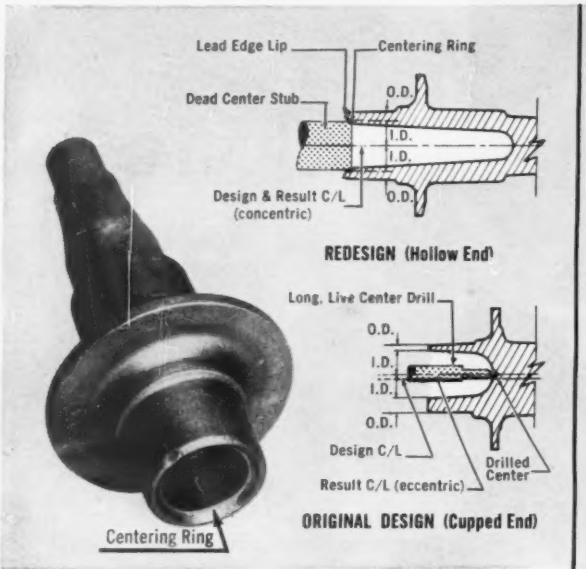
Superior Parts at Lowered Cost with This Fresh Approach to Forging

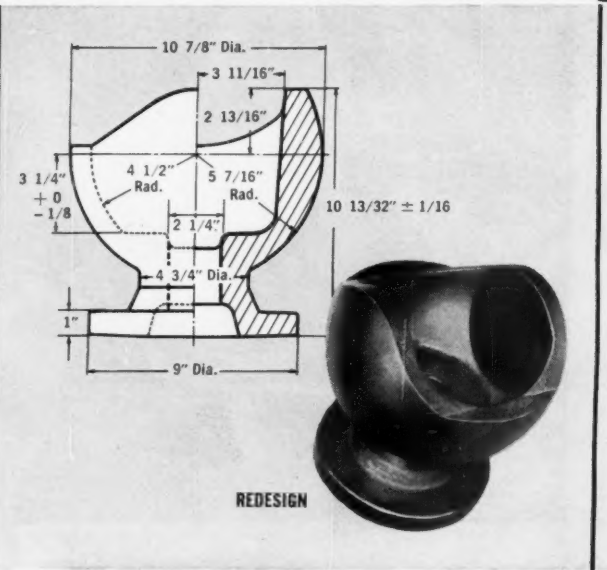
Many parts in use today are better as a result of design refinements suggested by COMMERCIAL's forging experts. Below are examples of COMMERCIAL upset forgings which demonstrate how these design refinements have resulted in superior parts for the OEM at lowered cost. These examples may appear to you as unusual in design—and this is the point...



Forging Redesign . . . Cuts Cost, Eliminates Tool Breakage, Cuts Scrap

Original design of axle spindle forging required chucking on the O. D. to enable center drilling of both ends. Part was held between drilled centers for overall machining. Concentric cupped axle end was center drilled blind with long, live center drill. O.D. and I.D. concentricity was difficult to maintain—causing eccentric drill centers. Result: tool breakage and machining scrap.

COMMERCIAL's redesign calls for a centering ring on inside edge of hollow end, forged without concentricity problem. Lead edge lip protects this important centering ring. The part can now be held for overall machining by a dead center stub engaged in the centering ring. Result: center drilling of open end not required, tool breakage eliminated, no machining rejects, metal savings.



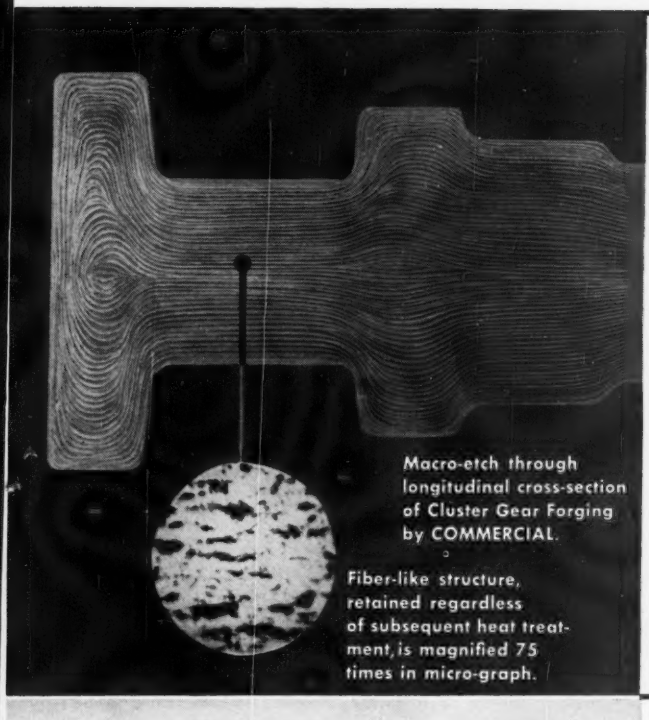
Unusual 80 lb. Forging . . . Reduces Cost, Replaces 95 lb. Casting

Ball joint housing for heavy duty steer and drive mechanism . . . formerly a steel casting. Field failures were traced to hidden metal faults. The housing was unable to withstand shock loadings encountered.

Problem: redesign for required strength—part to be no larger, no heavier, same shape.

Solution: an upset forging of unusual shape—flanged on one end, belled on the other, open at both ends. COMMERCIAL collaborated in the design and produced the part free of hidden metal flaws with sound, tough metal throughout—failures eliminated. Plus . . . weight saving over 15%, saving in machining cost 10%, greater strength-to-weight ratio.

When it's a vital part,



Macro-etch through longitudinal cross-section of Cluster Gear Forging by COMMERCIAL.

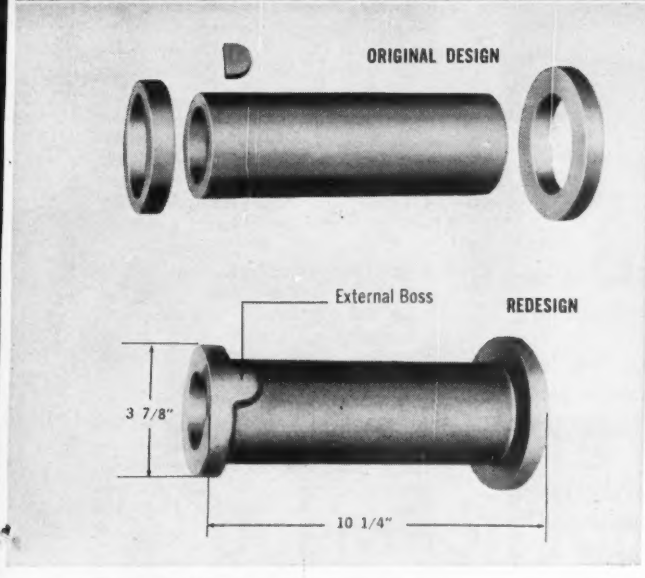
Fiber-like structure, retained regardless of subsequent heat treatment, is magnified 75 times in micro-graph.

Metal Quality Facts

Forgings start with "Forging Quality" rolled steel . . . steel that is closely controlled in its making for the purpose of eliminating defects and obtaining soundness—surface and interior. Such quality steels have been hot worked to obtain maximum development of their potential physical properties. Grain structure has been refined into a fibrous flow in the direction of working.

Mechanical hot forging of "Forging Quality" steel forces the metal in its plastic state to conform to specified shapes and achieves a vast improvement in its "as rolled" metal quality. Forging kneads the metal into a dense mass of strength and toughness and positions it into commercially exact dimensions and shape in all directions.

Upset Forging in closed dies produces by squeeze pressure a "looped" grain flow and permits concentration of grain density at points where the service stresses are calculated to be the greatest. Also, control of the directioning of the inherent fiber-like structure provides for maximum strength of the metal at required stress points. Not only are the properties of the metal improved in all directions but also the metal structure is refined and compressed resulting in a structural uniformity that renders the metal remarkably free from concealed defects.



One Piece Forging . . . Lowers Cost, Eliminates Four Piece Weldment

Blank for hydraulic cylinder outer barrel used to position Nike missile...originally a weldment—a tube, two flanges and a boss.

Problem: cut unit production time to meet crash program schedule, reduce assembly and machining cycle, increase strength-to-weight ratio.

Solution: a difficult upset forging because of external boss. COMMERCIAL tooled and produced the part in one piece to print. Assembly time eliminated, less distortion . . . improved machining conditions, forged to closer tolerances, uniform metal quality, added tensile and torsional strength due to controlled grain flow, strength-to-weight ratio increased, delivery schedule satisfied.

better make it FORGED

Advantages of Upset Forgings

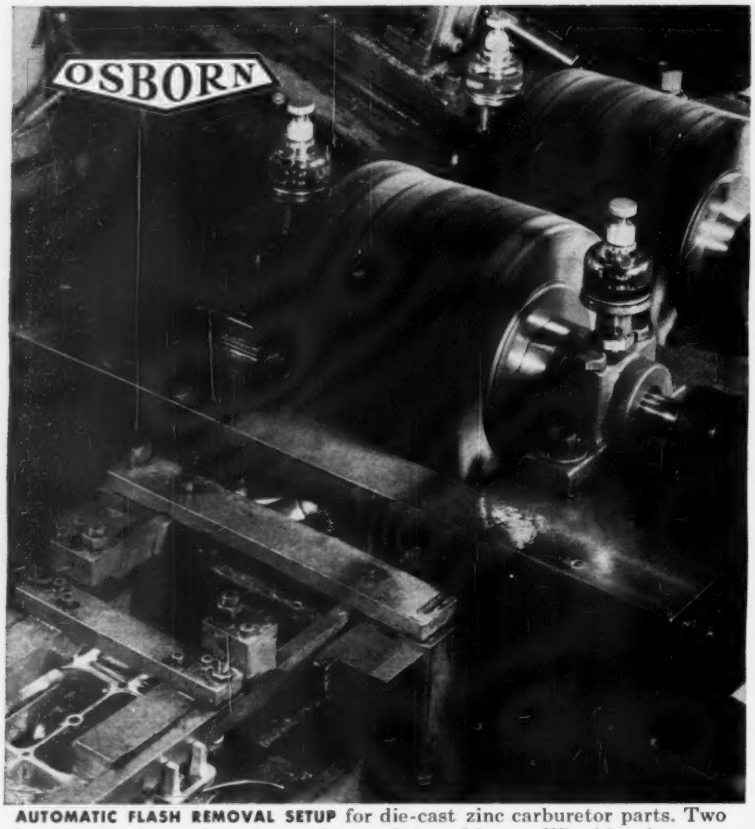
- *Uniform strength, toughness and high fatigue resistance insure longer, more dependable service life for equipment.*
- *Parts made closer to finished dimensions—cuts scrap, reduces machining and finishing time.*
- *Components can be assembled by simple production methods into complex parts.*
- *Uniform response to heat treatment gives desired physical properties of precise degree.*
- *Higher strength-to-weight ratio obtainable—a vital factor in the design complexity of parts for the future.*

Features of Upset Forging by COMMERCIAL

- *Batteries of upsetters from 1½" to 8"—custom or production runs.*
- *Hydra-Jet descaling prior to forging reduces imbedded surface scale.*
- *Magnetic particle depth inspection to detect metal faults before shipment.*
- *"Task Forging" team steeped with experience in producing the unusual upset forging.*

While designs are on the board, call on COMMERCIAL'S "Task Forging" team to collaborate with you—send print or sketch, sample or prototype. Address: Commercial Shearing & Stamping Co., Dept. L-5, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping



AUTOMATIC FLASH REMOVAL SETUP for die-cast zinc carburetor parts. Two brushing heads—each made up of seven Osborn Master® Wheel brushes—are mounted over the conveyor. Parts (shown fixtured in lower left corner) pass under brushing heads where all flash is removed as they travel to next work station.

OUTPUT TRIPLED from

200 to 600 an hour with OSBORN power brushing

Before: this auto equipment maker was using costly off-hand methods to remove flash from these die-cast zinc carburetor parts. Production was slow . . . it varied from shift to shift, averaging about 200 pieces per hour.

Now: parts are Osborn power brushed clean as they travel between work stations by conveyor . . . *eliminating manual handling.* The setup of Osborn Master® Wheel brushes does the job at rates up to 600 pieces per hour . . . *three times as fast.* The operation is simple, inexpensive. Results are uniform, with excellent quality control.

This application is typical of how *your* tough metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be solved with today's Osborn power brushes and brushing methods. An **O**sborn **B**rushing **A**nalysis—made at no obligation in your plant now—is the first step. Write or call *The Osborn Manufacturing Company, Dept. S-31, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

Osborn Brushes

Metal Finishing Machines . . . and Finishing Methods

Power, Paint and Maintenance Brushes • Foundry Production Machinery

CALENDAR

OF MEETINGS

Feb. 10-12, American Electroplaters Society: Interim meeting, Statler-Hilton Hotel, Hartford, Conn. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

Feb. 13-15, American Management Association: Personnel conference, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Feb. 15-17, American Management Association: Marketing conference, Hotel Roosevelt, New York. Association's address: 1515 Broadway, New York 36, N. Y.

Feb. 16-17, National Industrial Conference Board Inc.: General session for all associates, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Feb. 20-22, American Management Association: General management conference, Hotel Olympic, Seattle. Association's address: 1515 Broadway, New York 36, N. Y.

Feb. 23, Cutting Tool Manufacturers Association: Annual meeting, Harmonie Club, Detroit. Association's address: 416 Penobscot Bldg., Detroit 26, Mich. Executive secretary: Martin J. Ewald.

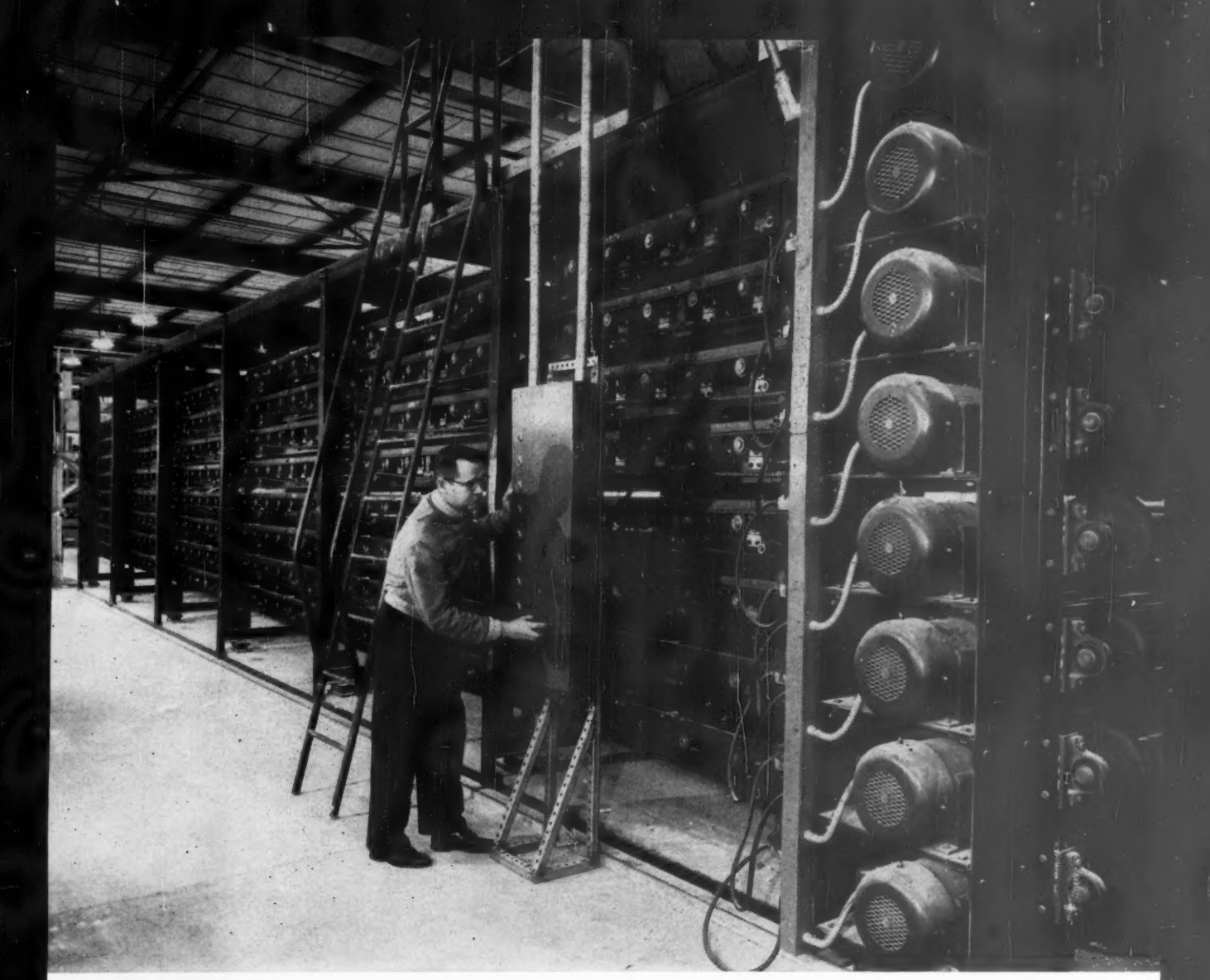
Feb. 23-24, Alloy Casting Institute: Winter meeting, Boca Raton Hotel, Boca Raton, Fla. Institute's address: 1001 Franklin Ave., Garden City, N. Y. Executive vice president: E. A. Schoefer.

Feb. 26-Mar. 1, American Institute of Chemical Engineers: National meeting, Hotel Roosevelt, New Orleans. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Antwerpen.

Feb. 26-Mar. 2, Metallurgical Society of AIME: Annual meeting, Ambassador and Chase-Park Plaza Hotels, St. Louis. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Feb. 27-Mar. 1, Association of Iron & Steel Engineers: Western meeting, Hotel Statler, Los Angeles. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Mar. 5-8, American Road Builders Association: Annual convention and exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J. Association's address: 600 World Center Bldg., Washington 6, D. C. Executive vice president: L. W. Prentiss.



Century motors provide continuous operation for oven conveyor

Eight Century 2-horsepower, squirrel-cage, totally-enclosed-fan-cooled motors accelerate materials onto an 8-deck feed-in conveyor at precise feed-in speeds.

At the end of this conveyor system is an oven. Materials must enter this oven at continuous speeds, and materials must be delivered to the oven constantly during each plant shift. A comparable 8-deck conveyor system is at the other end of the oven to remove the baked materials for cooling and stacking.

These eight Century motors assure the continuous flow operation pictured here. Top-quality Century motors provide the dependability required for long hours of stop-start operation.

Your Century sales and application engineer, a full-time motor specialist, can help you choose the right motor for your needs from Century's full line of from 1/20 to 400-horsepower motors. Just contact him or your authorized Century motor distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-12

GOODYEAR

NEWS! ONLY V-BELTS BY GOODYEAR

to give you sets matched in length to pull together

What's more, Green Seal V-Belts give you—

True dimensional stability for the life of the belt—built in through the use of shrink- and stretch-resistant 3-T Process Cord or airplane-type steel cable.

Mildew-inhibited construction for protection in damp operating conditions.

Widest selection from the most complete V-belt line anywhere.

Ready availability from distributor stocks in every part of the country.

Technical assistance whenever it's needed from a qualified expert, the G.T.M.—Goodyear Technical Man.

For the best buy in V-belts call your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from GOOD

GREEN SEAL ARE CODED TO 1/32"...

perfectly for longer, more trouble-free service

LENGTH-CODING GREEN SEAL V-BELTS TO 1/32"—NOT JUST 1/10", LIKE MOST BELTS—takes this ultra-precision machine. Only Goodyear has this type equipment, which is set by means of fine tolerance steel templates to insure accuracy. Machine readings are in the actual code numbers used to eliminate errors.

Green Seal—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

YEAR INDUSTRIAL PRODUCTS

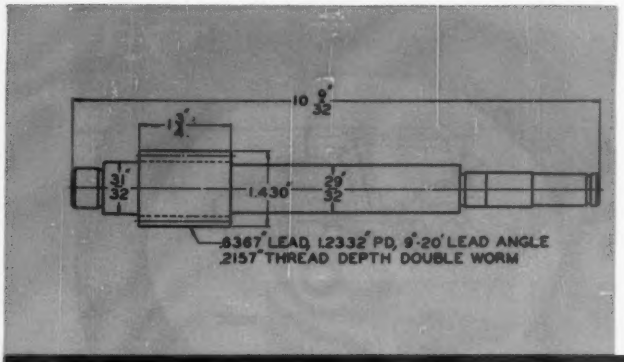
THREAD ROLLING

Shown here are five field installations in which the LANHYROL and LAN-NU-ROL Thread Rolling Machines have produced outstanding results and surpassed the highest of expectations. Production data from these representative jobs, shown on the opposite page, indicate the unequalled output, flexibility, and range coverage of these revolutionary machines.

Both Machines produce strong, accurate threads of excellent finish by the chipless, cold-forming process using four different Rolling Methods—Thrufeed, Infeed, Continuous and Reciprocal. The larger LANHYROL will thread all diameters from 0 to 3″ and the smaller LAN-NU-ROL 0 to 2″. Each Machine produces left- and right-hand threads of all types (except square), including UNC, UNF, Acme, Worm, and many special forms and is well adapted for automated processes. Soon to be announced will be the HY-DUTY Thread Rolling Machine. It will have a larger diametrical capacity than either the LANHYROL or LAN-NU-ROL. Watch for it soon.

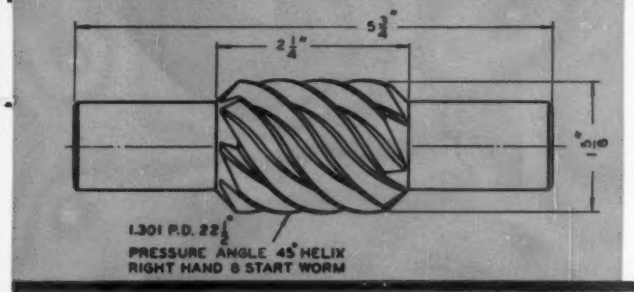
LANDIS *Machine* COMPANY
WAYNESBORO. PENNSYLVANIA
THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

601C



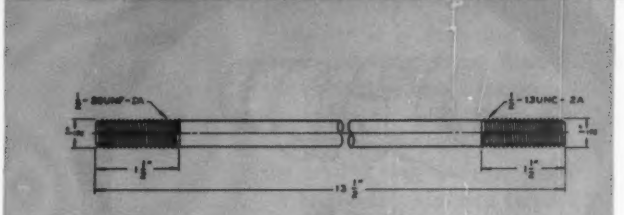
ROLLING INCREASES PRODUCTION FROM 4 TO 200 PER HOUR

Process—Infeed Rolling
Equipment—LANHYROL Thread Rolling Machine
Workpiece—Worm for an automotive-type differential for a riding lawnmower
Material—A.I.S.I. 8620 steel
Thread Specifications:
Diameter—1.430"
Length—1-3/4"
Type—.6367 lead, 1.2332" P.D., 9°-20' lead angle, .2157" thread depth, double worm
Production—200 pieces per hour (at 100% efficiency)



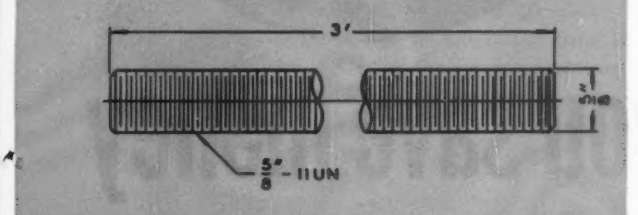
AUTOMATED ROLLING OF COARSE WORM PINION

Process—Reciprocal Rolling
Equipment—LANHYROL Thread Rolling Machine
Workpiece—Gear-reducer worm
Material—C1018 steel
Thread Specifications:
Diameter—1-5/8"
Length—2-1/4"
Type—8 start, 1.301" P.D., 22-1/2° pressure angle, 45° helix, right-hand worm
Production—180 pieces per hour (at 100% efficiency)



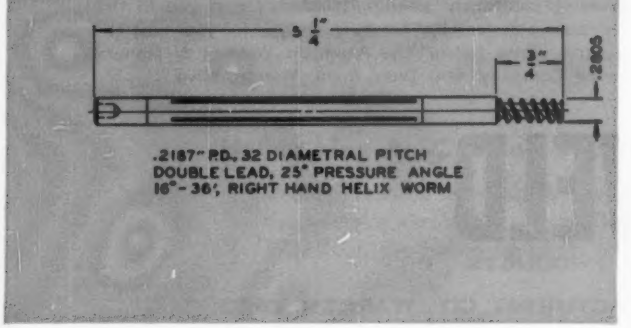
ROLLING DIFFERENT DIAMETER AND PITCH THREADS IN ONE PASS

Process—Continuous Thread Rolling
Equipment—"Extended Spindle" LANHYROL Thread Rolling Machine
Workpiece—Double-end stud
Material—8640 steel
Thread Specifications:
Diameter—1/2" (both ends)
Length—1-1/2" (both ends)
Type—20 pitch U.N.F. one end, 13 pitch U.N.C. on the opposite end
Tolerance—2A (both ends)
Production—103 pieces (both ends threaded) per minute (at 100% efficiency)



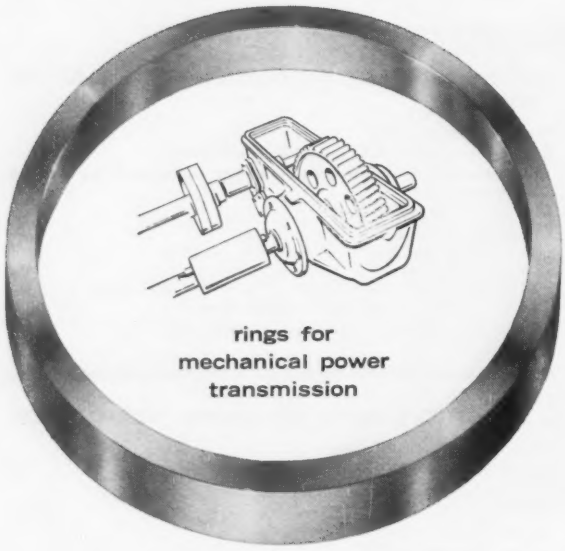
AUTOMATIC THRUFEED ROLLING CUTS LABOR COST

Process—Automatic Thrufeed Thread Rolling
Equipment—LAN-NU-ROL Thread Rolling Machine
Workpiece—Continuously-threaded bar
Material—A.I.S.I. 1018 steel
Thread Specifications:
Diameter—5/8"
Length—3'
Type—11 pitch UN
Production—216 inches per minute (at 100% efficiency)



LAN-NU-ROL PROVES IDEAL FOR SHORT-RUN WORM ROLLING OPERATION

Process—Infeed Rolling
Equipment—LAN-NU-ROL Thread Rolling Machine
Workpiece—Motor armature shaft for hand mixer
Material—A.I.S.I. C1040 steel
Thread Specifications:
Diameter—.2805"
Length—3/4"
Type—.2187" pitch diameter, 32 diametral pitch, double lead, 25° pressure angle, 16° 36', right-hand helix worm
Production—368 pieces per hour (at 100% efficiency)



we make rings-you save money

Amweld flash butt-welded rings provide a welcome cost reduction opportunity for almost any manufacturer using rings of between four inches and eight feet in diameter from most of the common and exotic alloy metals. Amweld rings save on material because rings are formed closer to finished dimensions. Amweld rings save on machining, because the metal is left out—not hogged out.

Amweld customers saved over one million dollars last year. By close cost evaluation of circular components and assemblies, flash welded rings were introduced enabling substantial savings. It doesn't cost you to think on paper with Amweld. Let us quote you for your cost comparison. Write today: The American Welding & Manufacturing Company, 800 Dietz Road, Warren, Ohio.

AMWELD®
INDUSTRIAL PRODUCTS

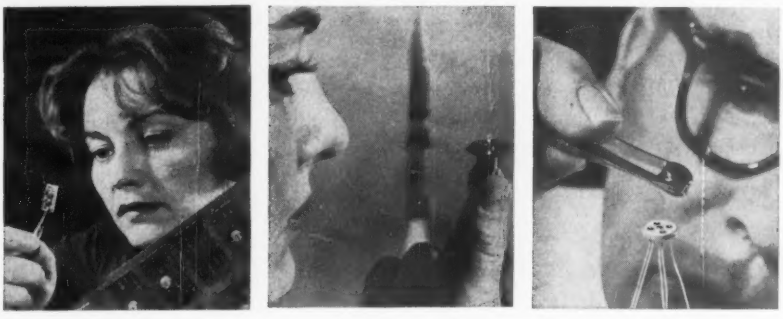
THE AMERICAN WELDING & MANUFACTURING CO., WARREN, OHIO

STEEL
The Metalworking Weekly

Metalworking Week®

January 30, 1961

Three Innovations Point Up Trend to Miniaturize



"Think small," is the slogan in electronics today, as the need to miniaturize grows stronger. The tiny tunnel diode wafer (above left) is part of the circuitry devised by Radio Corp. of America as a first step toward an ultraswift computer it is designing for the Navy. RCA claims the new circuitry will work 100 times faster than any existing system and 1000 times faster than the circuits in most data processors now in use. Action will take place at about the speed of light. The miniature pressure switch (center), made by B. F. Goodrich Aviation Products, is the size of a cigaret filter with a dime on the end; it will indicate when missile batteries are fully charged and ready for blast-off; it also will be used in industrial instrumentation. The Twin-sistor (right) is an RCA development that combines two transistors "to give a tenfold boost to a battery's voltage—12 volts to 120, for example," the firm says.

December Upturn Gives Machine Tools Fair Year

Net new orders for metal cutting machine tools rose to $47.6 million in December to produce a 1960 total of $503 million—1 per cent below the 1959 total. December orders for metal forming machine tools totaled $11.7 million for a $150 million year—less than 1 per cent above the 1959 mark. Foreign orders for metal cutting types in 1960 soared 127 per cent above the 1959 total and foreign orders for metal forming varieties rose 64 per cent. Except for 1958's miserable performance, the 1960 new order volume was the lowest since 1949.

Rarick Bows Out

Donald C. Rarick, symbol of rebellion in the United Steelworkers, is giving up the fight. He has withdrawn his federal court suits against the union and is urging unity in the ranks. He said he believes the USW is "entering into a new era."

Heller May Be Cool on Depreciation Reform

While President Kennedy has made public statements favoring reform of the federal government's depreciation policies, his top economic adviser, Walter W. Heller, has hinted he might resist such a move. Among his past remarks:

In a speech in Atlantic City last summer, he said that a tax concession to consumers would seem to be the best "short run" method of stimulating the economy when demand was slow. He also told the House Ways & Means Committee last winter that he doubted whether favorable tax treatment of depreciation stimulated proper growth. He noted that accelerated depreciation would favor industries with heavy capital investments but would neglect those with large investments in human resources. He feels that a shortage of brainpower is slowing economic growth and that a tax incentive for educational resources might be a good move.

Salt Has Raw Material Possibilities

Scientists at Minneapolis-Honeywell Regulator Co. believe salt has good potential as a raw material for electronic components. They have developed advanced infrared measuring techniques to determine the basic structure of salts (including the table variety) when they are heated to a liquid state. They report that molten salts have "unique and useful" characteristics and have already been used to generate electricity and as electrical switches.

Road Is Rougher for Foreign Cars

December registrations of imported cars held at or below the November mark (32,479), which was the smallest monthly total in 26 months, says *Ward's Automotive Reports*. Volkswagen continued strong, with 14,252 dealer deliveries in December. It probably claimed 40 per cent of the imported car market during 1960's last quarter.

Akron Firm Develops Plastic Auto Muffler

Proman Inc., Akron, Ohio, has patented an auto muffler made of phenolic plastic resinol reinforced with asbestos. The firm claims it will outwear any metal muffler and cost less. Proman says it will not make the muffler but is negotiating with two firms to produce it.

Profit Micromargins Thwart Growth

Metalworking's net profits per dollar of sales have dropped 38 per cent in a decade. Aftertax earnings on stockholders' equity have plummeted too. The profit squeeze is tighter in metalworking than in most other industries. The dangerous situation is helping to thwart our rate of growth. It takes industry to provide jobs; it takes capital to build industry; and it takes profits to develop and enlarge the capital supply. The trend must be reversed (Page 71).

Machine Will Punish Itself for Its Errors

Melpar Inc. will build an electronic nerve cell with the power to simulate elementary thought processes. Under an Air Force contract, the firm will fabricate a cell that will learn as a result of reward and punishment signals. Then the firm will design digital computer simulation of a network of the cells to include self-generation of the reward and punishment signals. Project

Engineer L. O. Gilstrap says the nerve network principle may bring about "thinking machines" for more automatic weather prediction, unmanned vehicles for exploring the surfaces of planets without remote control, and high speed military gaming machines that can formulate their own strategy.

Pipeline Suppliers Have Better Days Ahead

For the first time in many months, most business factors affecting producers of line pipe, pumps, valves, and auxiliary pipeline equipment are favorable. Authorizations from the Federal Power Commission are coming through at a good rate. Pipeline construction firms have announced record expansion plans for 1961. Pipe inventories are coming under control. So expect an improvement in pipemaking operations shortly (Page 129).

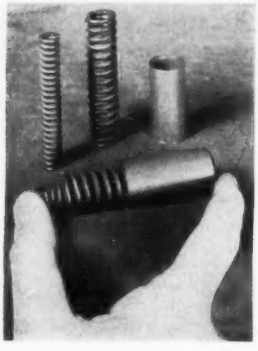
Will Prices Fall 1 Per Cent Annually After 1965?

John A. Collins, economist for Aluminium Ltd., writing in the *Financial Analysts Journal*, predicts that wholesale prices in the U. S. will rise about 3 per cent annually during 1961 and 1962, remain stable during 1963-65, then fall at an average of 1 per cent a year until at least 2000. Here's his index of wholesale prices (1815 = 100):

1815	100	1946	100	1962	161	1970	152
1895	40	1960	152	1965	161	2000	110

Mr. Collins believes that the main reason why prices rise or fall for long periods lies in the degree of competition. He thinks that intense competition, technological breakthroughs, and productivity advances will bring about the price decline.

How to Select the Right Superalloy Spring



If you're experiencing spring failures from heat or corrosion, you might want to consider the superalloys. They're working well where conventional alloys are impractical. For example, they are being used in aircraft, missiles, motors, control systems, nuclear equipment, instrumentation. They might also be used in automatic toasters, electric irons, and gas turbine engines for autos. Some jobs can be tackled with ferrous base materials; nickel and cobalt base alloys have wide utility. For tips on how to select the right variety, see Page 96.

How to Learn More by Listening

The average American speaks at a rate of 125 words a minute among his friends, 100 words a minute in front of an audience. But most of us think at a speed of 400 to 500 words per minute. So most speakers have trouble holding the audience's attention. The upshot: Learning from listening is only

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25 per cent efficient on the average. Two days after a talk, you've forgotten three-fourths of what you heard. So says the University of Minnesota's R. G. Nichols. To improve retention, he suggests: 1. Try to anticipate the speaker's next comment. 2. Identify what's being used by the speaker to support his points. 3. Make mental summaries every 3 to 4 minutes.

Electronics Industry Bemoans Imports

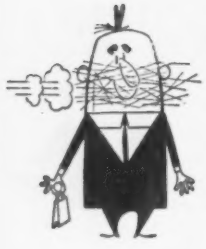
Of the transistor radio batteries sold in the U. S. last year, 42 per cent (or 8.2 million) were made in Japan. The National Electrical Manufacturers Association predicts the Japanese will grab 55 per cent of the U. S. market this year. James D. Secrest, executive vice president of the Electronic Industries Association, says Japanese products are causing problems for radio and TV dealers. He also says the Japanese practice of requiring cash payments with orders has tied up large amounts of dealer capital.

U. S. Tax Rates Highest

"The U. S. government is a majority shareholder in the profits of every substantial American corporation." So says the First National City Bank of New York in a report on taxes around the globe. The bank lists these maximum rates of taxation:

	On undistributed corporate profits	On personal income		On undistributed corporate profits	On personal income
U. S.	52%	91%	Belgium	40%	65%
United Kingdom	51.25	88.75	Australia	40	66.67
Germany	51	53	Sweden	40	65
France	50.98	73	Norway	34	55
Canada	50	80	South Africa	25*	47.5
Netherlands	47	72.5	Italy	20†	58
Japan	45.44	70	Switzerland	8	8

*An extra 25 per cent tax is levied on profits (beyond certain limits) not distributed. †In addition, there is a 15 per cent tax on profits in excess of 6 per cent of capital and reserves.



Straws in the Wind

The youthful Hungarian television industry plans to turn out 1 million TV sets during the next five years, of which 500,000 will be exported . . . Nuclear Systems Div., Marquardt Corp., says it has designed a nuclear plant to produce electric power at costs competitive with conventional steam-electric plants in the 5000 to 20,000 electrical kilowatt range . . . Wabush Iron Co. Ltd. will begin a $20 million construction project in Canada this year.

Metalworking Pulse

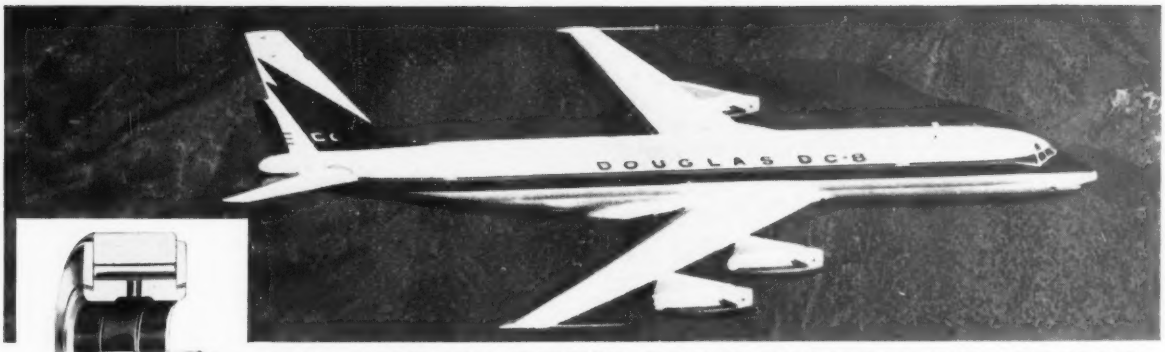
The Business Trend: The plusses and minuses in the week ended Jan. 21 nearly balanced each other, resulting in a dip of 1 point in STEEL's industrial production index to a preliminary 148 (1947-49=100). **Autos:** Cold weather and inventory adjustments caused output to drop at midmonth. The situation has not improved markedly since. Production schedules for both January and February have been shaved. **Steel:** Production is leveling off close to 1.5 million tons.

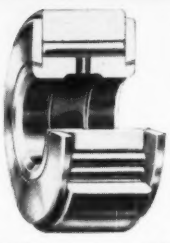
- **INDUSTRIAL PRODUCTION INDEX** (1947-49=100)
  Week ended Jan. 21 . . . . 148†
  Year ago 185
  Details on Page 81

- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Jan. 28 . . 102,000*
  Year ago 173,231
  Details on Page 78

- **STEEL INGOT OUTPUT (TONS)**
  Week ended Jan. 28 1,500,000*
  Week ago 1,499,000
  Details on Page 132

†Preliminary. *Estimated.

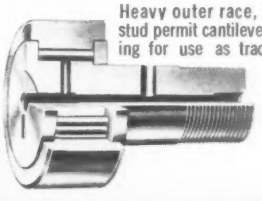




Extra heavy outer race for heavy rolling loads. Also available in double row type.

JET AHEAD WITH TORRINGTON BEARINGS–

ON ALL THE GREAT NEW JETS



Heavy outer race, integral stud permit cantilever mounting for use as track roller.

Specially designed to withstand heaviest rolling and shock loads, Torrington Track Rollers and Cam Followers are at the heart of take-off and landing procedure on all the new commercial jets.

Tremendous speeds and carrying capacity of jet aircraft impose heavier than ever loads on the flaps, yet their operation must be smooth, efficient, 100% sure. Torrington engineers developed larger, tougher track rollers and cam followers... bearings specially designed for performance and the utmost in dependable commercial jet service.

Track rollers and cam followers, compact and light in weight, offer maximum radial capacity in minimum cross section. A full complement of small diameter rollers insures minimum starting and running friction.

Torrington aircraft bearings are manufactured to the highest standards in the industry. For further information or application assistance, write or call Torrington—maker of every basic type of anti-friction bearing.

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY Torrington, Conn. • South Bend 21, Indiana

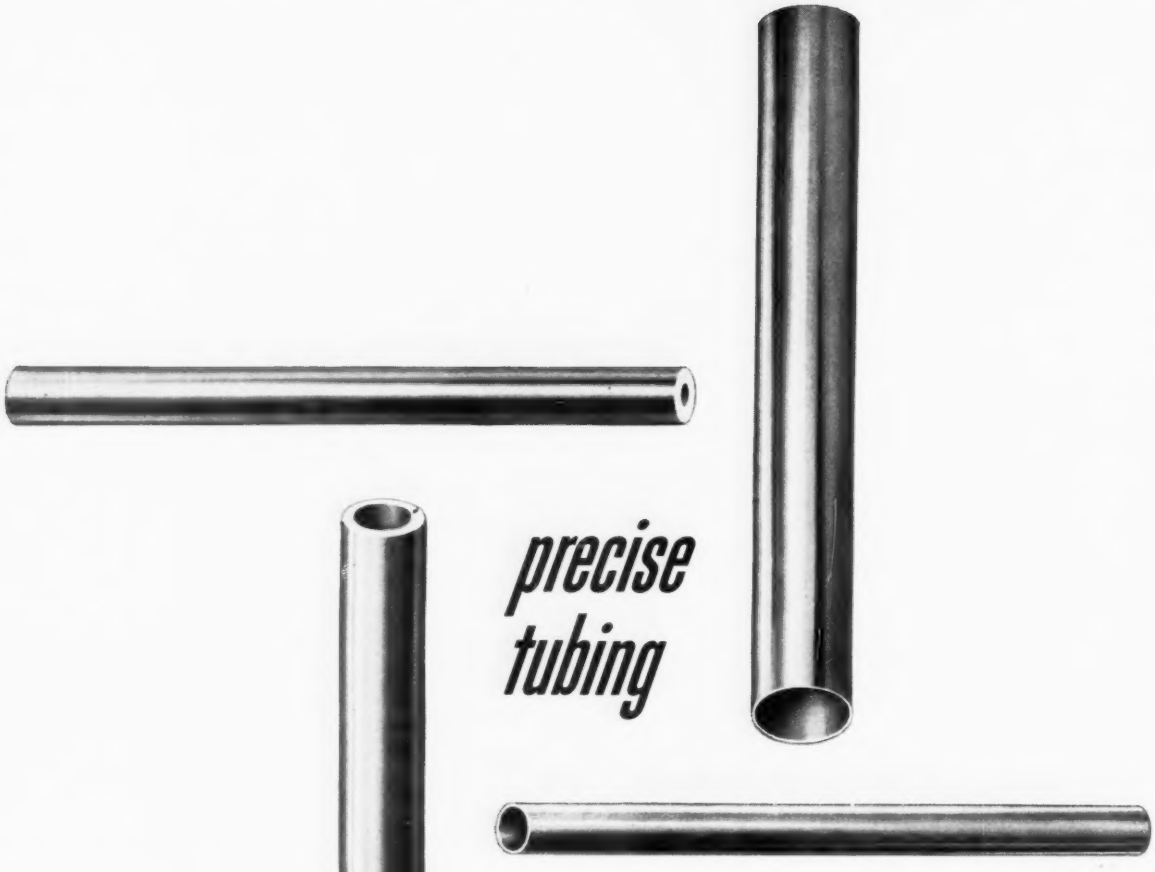
"On the waterfront...

it's 8:22 p.m. . . . the ship is loaded . . . sailing time is dawn tomorrow. We loaded 2,200 tons of cargo in her hold today, starting at sun-up. Tomorrow there'll be another ship . . . another day of lifting, hauling, storing.

"When you work like that from day to day, you need a truck that can stand the gaff . . . you need a truck that can handle the load with ease and put it where you want it—fast. You need a Clark to work with."

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek, Michigan

For full details,
see your local Clark Dealer



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In a wide selection of seamless and welded and drawn up to 1" O. D.

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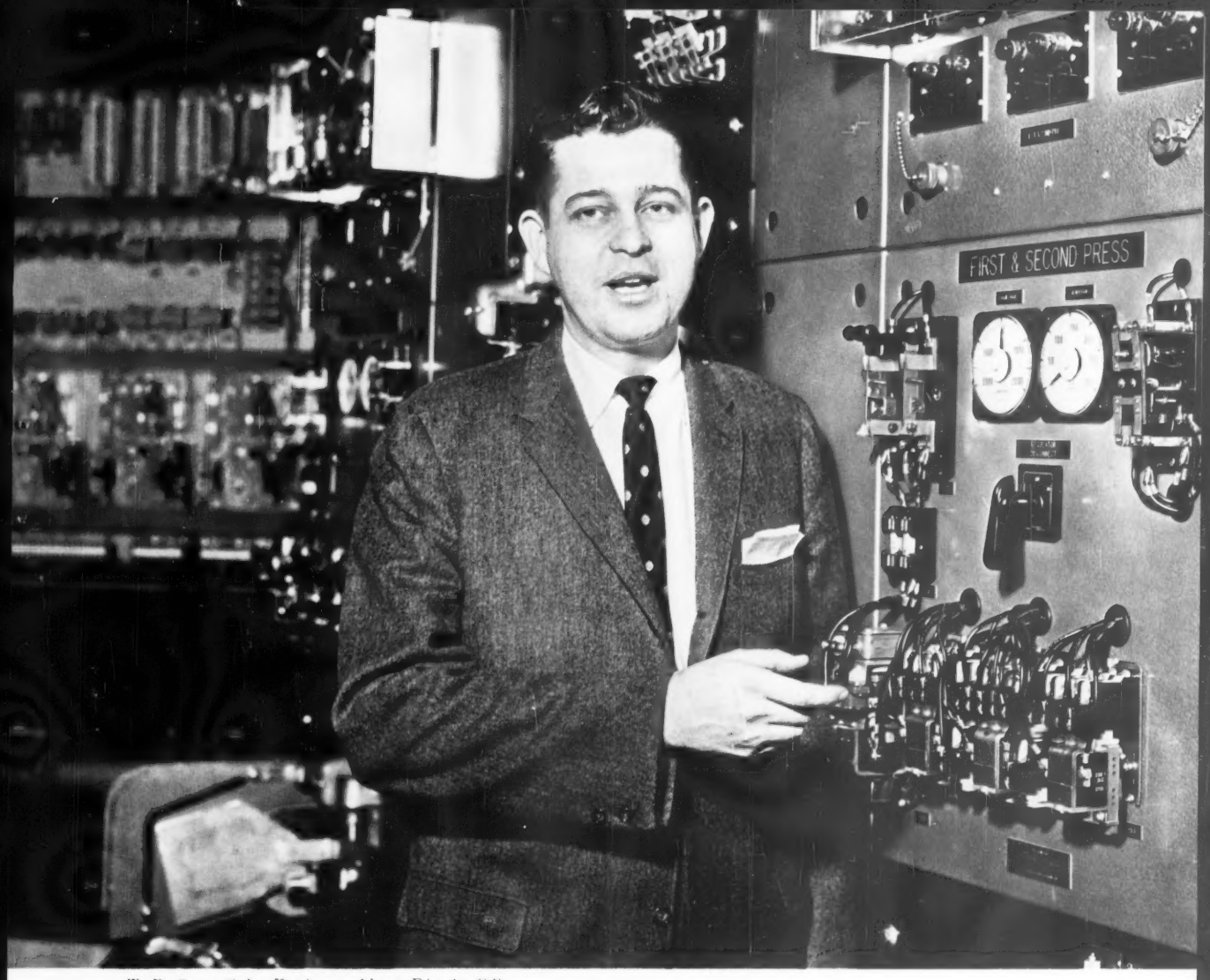


T. R. Corn, Sales Engineer, Akron District Office.

This is Tom Corn, a Reliance Sales Engineer. Use this man the way he can be used, and you'll be buying not only good products, but a trained insight into the problems of applying electric motors and drive systems to products and processes, such as . . . . . .

RELIANCE ELECTRIC AND ENGINEERING COMPANY

Reliance meets the peculiar needs of progress.

Loading or unloading of United Jet Mainliner passengers in three minutes is now an accomplished fact at major air terminals.

Product of the jet age, this "Jetway" passenger loader came to life as a result of some unique engineering on the part of Reliance and the Pacific Iron and Steel Co.

Reliance engineered a drive system that makes the "Jetway" as easy to handle as an automobile. One operator moves it into position against the plane doors in less than a minute. Operation is smooth and stepless. Separate controls compensate for weight changes as the load shifts from plane to ramp and vice versa.

Adapting Reliance products to this unusual vehicle called for imagination and ingenuity . . . and the "Jetway" works fine.

The "Jetway" ramp now is used by several major airlines, and is operated by Reliance gearmotors, electronic exciters and motor-generator sets which convert airport a-c. power to d-c. More "Jetway" ramps are being installed at important terminals throughout the country.

RELIANCE ELECTRIC AND ENGINEERING COMPANY

Something more than electricity keeps this Reliance Motor running.

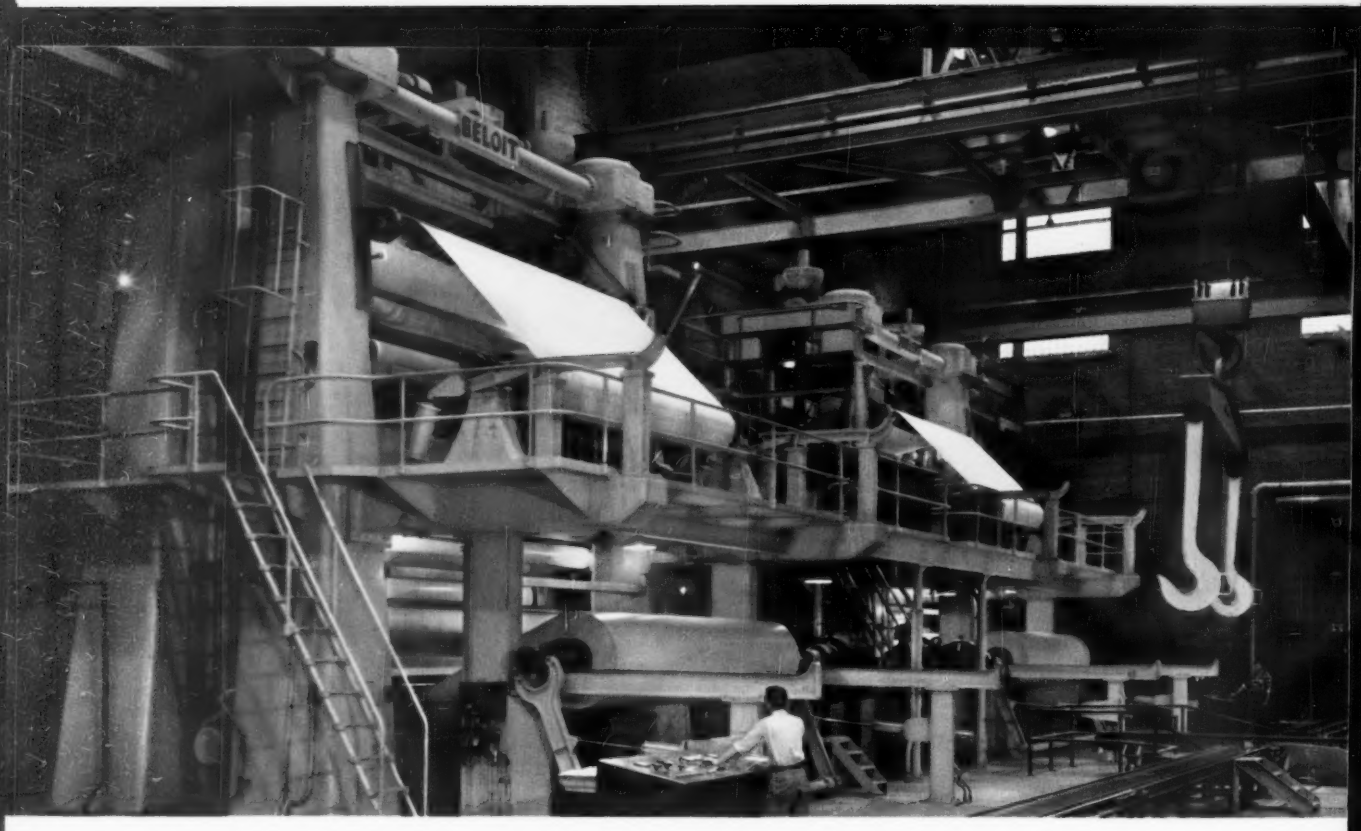
The oil field motor that drives this unit is protected, inside and out. It is not affected by dust, dirt, water or changes in the weather.

Reliance engineered and built this weather-proof motor, which is operating an oil well pump, in order to provide continuous operation with negligible maintenance . . . otherwise it wouldn't be where it is.

There are many such areas in the country where Duty Master Motors are subject to extreme environmental conditions. Yet the weather-proof is only one of a broad line developed to meet any a-c. motor requirement . . . and that takes in a lot of territory. Duty Master's wide acceptance is testimony to the creative engineering which produced it.

This 15 hp. Duty Master operates an oil well pumping unit at the Fair-Glenn Field, Sapulpa, Oklahoma. Sound insulation, rodent screens and the "Metermatic" lubrication system are vital qualities of this motor which performs so well in areas where weather and infrequent supervision are factors. It runs 24 hours a day regardless of adverse conditions.

RELIANCE ELECTRIC AND ENGINEERING COMPANY



It takes more than horsepower to make a quality product.

These two super-calendar machines put a rich, glossy finish on paper. Alternate steel and cotton rolls produce a buffing, or polishing action on the previously treated product. Reliance Drives keep speeds of various rolls exactly regulated so that uniform, precise tension is maintained.

The big design trick here is to maintain exact tension during acceleration and deceleration of the drive system. Process requirements call for frequent speed changes. Any variation of tension during these changes is dangerous. The paper "web" can break, rolls can jam, the system can go haywire. But this one doesn't.

Reliance Engineers were in on this installation from start to finish . . . worked with company engineers to assure sound operation.

Tachometer feed-back systems with Reliance regulators keep the system perfectly controlled. Motors are synchronized to keep paper flowing smoothly at 2,000 feet per minute. A total of six machines in this mill are powered and controlled by Reliance, testimony to creative engineering and intelligent application.

Reliance Sales Engineers are ready to help your company solve motor and drive application problems . . . and they will act quickly and efficiently. There is a Reliance office near you. Check your telephone Yellow Pages . . . write, or call us direct.

A-1663

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 344A , CLEVELAND 17, OHIO
Canadian Division: Toronto, Ontario
Sales Offices and Distributors in Principal Cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

NEW 'BUFFALO' NO. 20

DRILLING MACHINE

Entirely new from the ground up . . . designed and built to give you the same consistent accuracy and extended service for which the complete 'Buffalo' drilling machine line is so well known.

Check These Features of the No. 20:

- **Designed for operator's convenience.**
- **Front-Mounted "Start-Stop" Push Button Switch.**
- **5-Step Pulley Drive (Or Optional Variable Speed Drive).**
- **Power Feed or Sensitive Hand Feed.**
- **Capacity: 1" in Mild Steel.**
- **Hinged Belt Guard Speeds Belt Changing.**
- **Positive Frame-to-Column Locking Device.**
- **Hand-Adjustable Spindle Return Spring.**

Available in floor, bench and pedestal models . . . one to six spindles.

For full details on the all-new No. 20 Drill (or any other model from the complete 'Buffalo' line), contact your 'Buffalo' Machine tool dealer or write us direct.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

MACHINE TOOL DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

395 MILLION MILES AGO

. . . Republic Stainless Steel flashed into the Van Allen belts with Explorer I

On January 31, 1958, at 10:48 PM, EST, America's first satellite was hurled into orbit from Cape Canaveral, Florida, by the U.S. Army. Explorer I is still orbiting. It has produced the most important space discovery to date—the Van Allen belts of radiation.

Explorer I's nose cone was fabricated from Republic Stainless Steel, Type 430, by the Lodge and Shipley Company, Cincinnati, Ohio. They used the Floturn Process to produce specified deviations in wall thickness.

Much has happened at Republic Steel since the launching of Explorer I. Republic has the *largest capacity for production* of vacuum melted metals . . . is the *largest producer* of steel for cold extrusion and cold heading . . . the *only source* for complete line of stainless sheets up to 60″ wide . . . a *new source* for complete line of PH Stainless Steels.

Today—three years later—Republic continues to be the world's largest producer of stainless and alloy steels.

REPUBLIC STEEL

Cleveland 1, Ohio

World's Leading Producer of Space Age Metals

Strong, Modern, Dependable

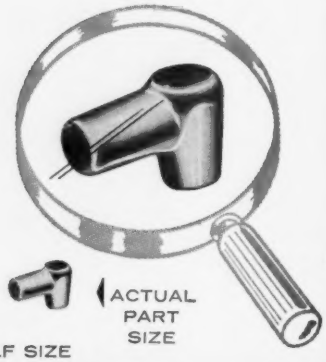
MUELLER BRASS CO. PRODUCES

SPECIFICATIONS . . . *REGARDLESS OF*

To obtain the desired physical and design requirements in a part at the lowest cost, there is usually one specific process by which that part can be most successfully and economically manufactured. Because the Mueller Brass Co. offers a variety of production methods, you get sound engineering, accurate production method analysis, our assurance of getting the best product at the lowest cost . . . regardless of metal specified or the size of your particular part.

BRASS, BRONZE, ALUMINUM FORGINGS

The two parts shown here dramatically illustrate the ability of the Mueller Brass Co. to produce precision forgings regardless of size or configuration. Both the tiny dental drill nozzle and the big heat exchanger shell hub, which is the largest of its kind ever produced, were forged to exacting specifications. The weight of the nozzle is only a few ounces while the shell hub weighs 40 lbs., and has a forged pocket 7 15/16" in diameter and 4 3/16" deep. By way of size comparison, the pocket is big enough to hold over 14,000 of these tiny drill nozzles. By forging the pocket, considerable machining time and money was saved. The sound, dense structure of the shell hub makes it ideal for the high pressure application for which it was designed. The forging not only does the job better, but was produced for 25% less than the casting it replaced. Experience makes it possible for the Mueller Brass Co. to produce high quality precision forgings regardless of specifications . . . why not put this experience to work for you?



ONE DEPENDABLE

Write today for Engineering Bulletins on any of these Products.

SCREW MACHINE PRODUCTS

POWDERED METAL PARTS

MUELLER BRASS CO.

PARTS ECONOMICALLY...TO EXACT

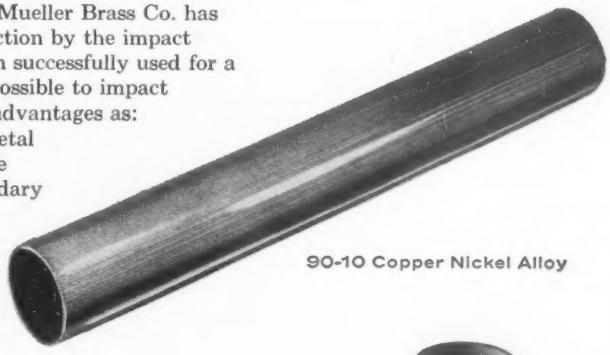
METAL, METHOD OR SIZE...

When you are designing, specifying or purchasing fabricated parts, call in the "Man From Mueller Brass Co." to help lower costs and improve your products. Sales and engineering service is available to you at Mueller Brass Co. offices throughout the United States. Make Mueller Brass Co. your one dependable source for all your part needs.

COLD PREST® IMPACT EXTRUSIONS

Today, because of vast experience in alloys, the Mueller Brass Co. has greatly expanded the possibilities of parts production by the impact extrusion method. Aluminum, of course, has been successfully used for a multitude of tubular shapes. But now it is also possible to impact parts of copper alloys incorporating such major advantages as: closer tolerances, better finish and appreciable metal savings. Because of dimensional accuracy possible with the impact extrusion, the necessity of secondary machining operations is often eliminated.

The parts shown here are representative of the group now being economically produced as impact extrusions by the Mueller Brass Co. who offer complete engineering and design service in the development of new parts from copper base alloys.

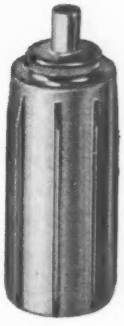


90-10 Copper Nickel Alloy

Aluminum Alloy 6061

Oxygen Free High Conductivity Copper

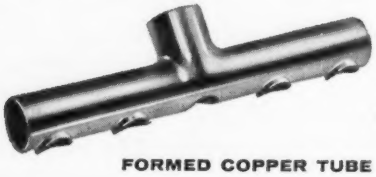
Special Alloy 902



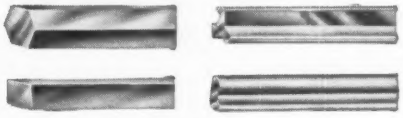
Tellurium Copper Alloy

Low Phosphorus Copper Alloy

SOURCE FOR ALL THESE OTHER PRODUCTS



FORMED COPPER TUBE



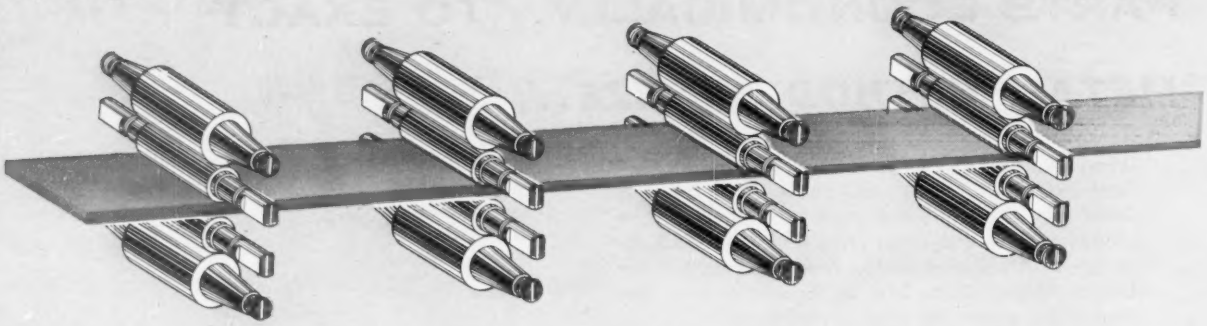
STANDARD and SPECIAL ALLOY ROD

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

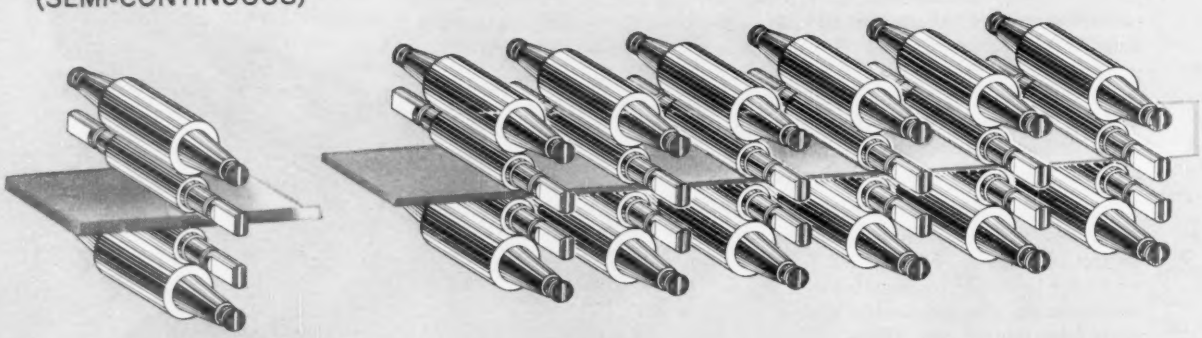
PORT HURON 26, MICHIGAN

319

(CONTINUOUS)



(SEMI-CONTINUOUS)



Mack-Hemp ***rolls are right for every mill...***

IN HOT STRIP MILLS...

These Mack-Hemp steel and iron rolls have met every test the nation's hot strip mills have put to them. They are:

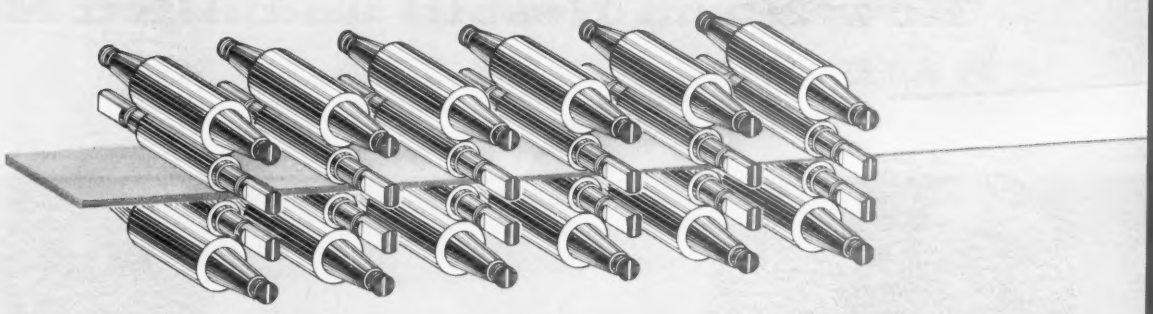
Technalloy . . . First heavy-duty cast alloy steel roll with high strength. An economical back-up roll for all 4-high stands, and a fine work roll in 2-high roughing stands.

Technikrome . . . A high-carbon alloy steel roll of wide versatility. A good roughing stand work roll under average operating conditions.

Nichillite . . . A definite chill alloy iron utility roll providing high hardness and wear resistance. Recommended for finishing work under good-to-average conditions.

Nironite A and AX . . . Nickel chromium alloy grain iron rolls with high strength and deep hardness penetration.

Nironite F . . . High alloy grain iron roll, double-poured for maximum core and neck strength, and specially heat treated to increase resistance to thermal shock and spalling.



KEY TO MODERN HOT STRIP ROLLING...

	CONTINUOUS		SEMI-CONTINUOUS	FINISHING TRAIN		
	Broadside Mill	Roughing Stands	Reversing Roughing Stand	Stands 1 & 2	Stands 3, 4 & 5	Finishing Stand
WORK ROLLS						
Good Conditions	Nironite AX 68 Shore	Nironite AX 68 Shore	Nironite F 68-72 Shore	Nironite F 74 Shore	Nironite F 78 Shore	#4 Nichillite 80 Shore
Average Conditions	Nironite A 65 Shore	Technikrome 40 Shore	Nironite F 68-72 Shore	Nironite F 74 Shore	Nironite F 78 Shore	#6 Nichillite 80 Shore
Severe Conditions	Technalloy 40-45 Shore	Technalloy 45 Shore	Technalloy 42-48 Shore	Superalloy 48-50 Shore	Nironite F 78 Shore	Nironite F 80 Shore
BACK-UP ROLLS (in 4-HI STANDS)	Technalloy 48 Shore	Technalloy 48 Shore	Technalloy 48 Shore	Technalloy 48 Shore	Technalloy 48 Shore	Technalloy 48 Shore

Midland Superalloy . . . A nickel-chromium-molybdenum alloy steel roll especially developed to withstand fire cracking and breakage under severe operating conditions.

• • •

In short, there is a Mack-Hemp roll that is just right for each stand and each set of operating conditions. This tailoring of the rolls to the mill is one of the important reasons why *you get more tonnage from the rolls with the striped red wabblers.*

MACKINTOSH-HEMPHILL

DIVISION OF

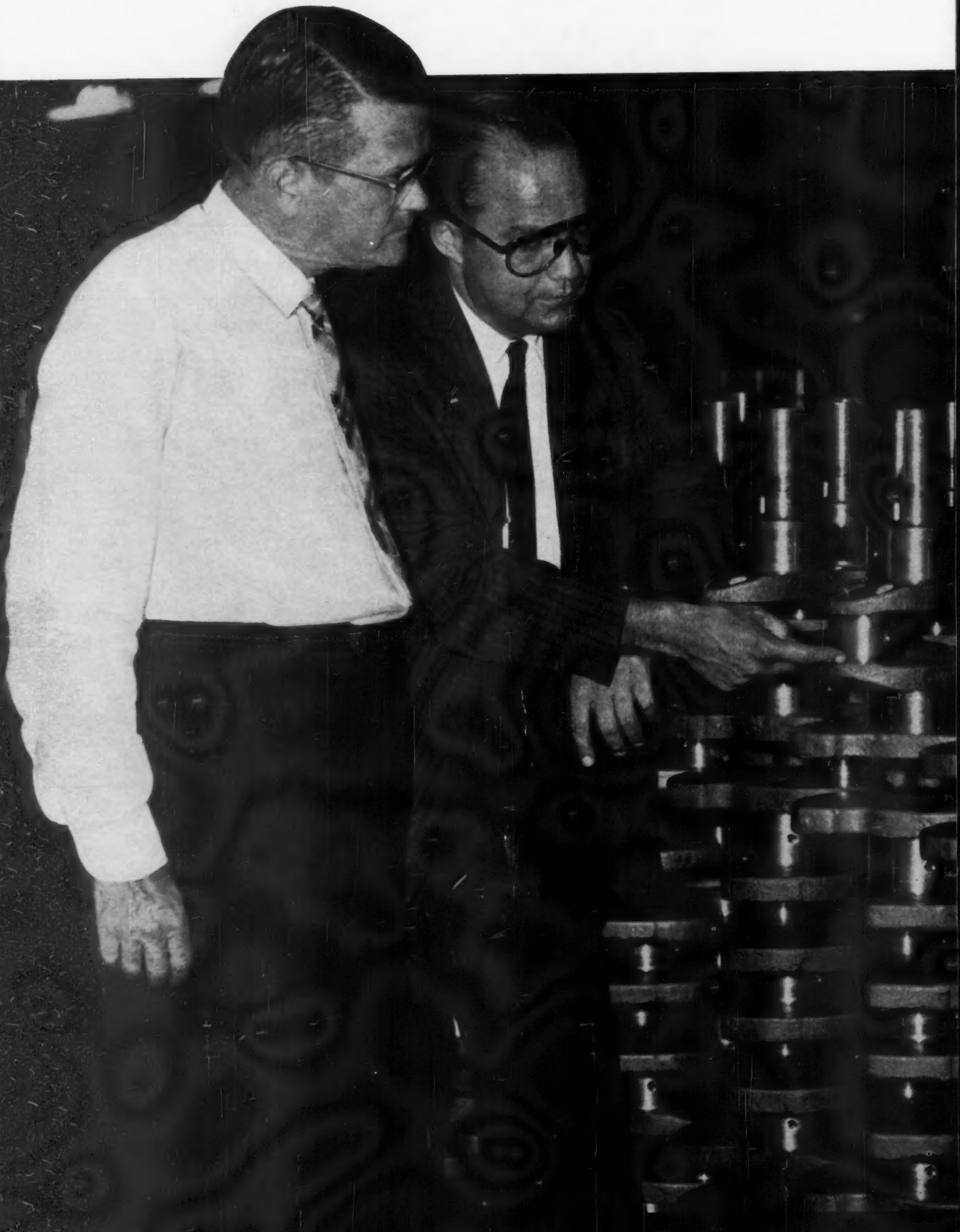
E. W. BLISS COMPANY

Pittsburgh and Midland, Pa.

MACKINTOSH-HEMPHILL DIVISION PITTSBURGH U.S.A.

BLISS

How Norm Nesbitt and Allen Moore



teamed up to cut dressing costs 50% at ATLAS CRANKSHAFT

This is a good example of the way it sometimes pays to break a habit even when it's a pretty *good* habit.

At Atlas Crankshaft Corp., in Fostoria, Ohio, the dressing wheels that are used to keep big crankshaft grinding wheels at peak performance play a very important part in maintaining production at a high and constant volume. There was nothing really wrong with the 6″ dressing wheels Atlas had been using for years. They did a pretty good job and usually lasted through an 8-hour day.

But Atlas' Purchasing Agent Norm Nesbitt wasn't content with "good enough". He wanted "better" and had his eye firmly fixed on no less than "best". He got hold of Bay State representative Allen Moore and told him to go to work on the problem.

Moore is thoroughly accustomed to the kind of abrasive problems that require long and painstaking analysis. But this time, he found that it was a case of the solution being so simple that nobody had thought of it.

He simply recommended a larger dressing wheel . . . an 8-inch wheel instead of the 6-incher that was being used. Both wheels were stubbed at 4″ but buying the larger wheel reduced the cost per cubic inch of usable abrasive 50% and cut the number of dressing-wheel changes from one a day to one every two days.

Not all abrasive problems are as easily solved as this one, of course. But the point of this case is both simple and important: The most obvious improvements in grinding operations are often the most difficult to spot. Your Bay State distributor and our direct representatives are thoroughly *trained* to spot the obvious and to *dig* for what is not obvious. You can't lose and you may well gain substantially by just turning them loose to analyze your grinding operations. *Better grinding at lower cost . . . that is their business.*

Atlas operator Paul Huff sets new 8″ dressing wheel against surface of big, crankshaft grinding wheel. 8″ diameter dressing wheel lasts twice as long as 6″ wheel because both are stubbed at 4″ and 8″ wheel costs half as much per cubic inch of usable abrasive.

Norman Nesbitt, left, as purchasing executive for Atlas Crankshaft Corp. for 15 years, has encountered, and successfully met, every purchasing problem "in the book" . . . and then some!

Allen Moore, abrasive specialist, with many years experience with distributors and grinding wheel manufacturers, has a broad knowledge of abrasive wheel applications. His Business Administration degree attests to his awareness of cost-savings importance.

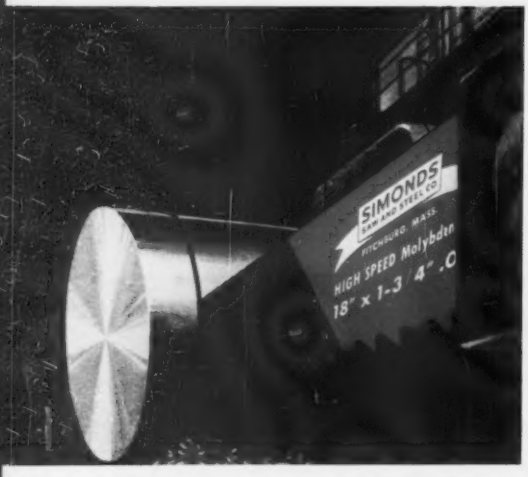
BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

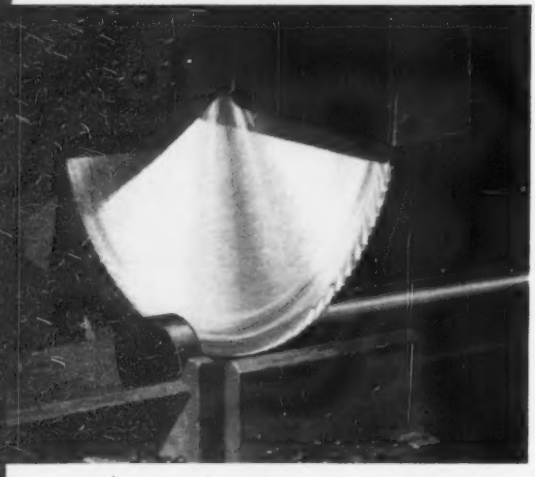
"RED TANG" FILES

For Faster, Easier Filing. Simonds "Red Tang" Files are sharper to start with, hog off more metal per stroke. More wear-resistant, too, they keep on cutting long after other files are dull and useless.



"RED END" HACKSAW BLADES

Up Your Cutoff Capacity. Simonds tough "Red End" Blades don't hack, but cut curled chips like the cutting tool on a lathe. Made of cross-rolled steel, they stay sharp longer, resist breakage, cut fast and straight — 3 types (hand and power) for all needs.



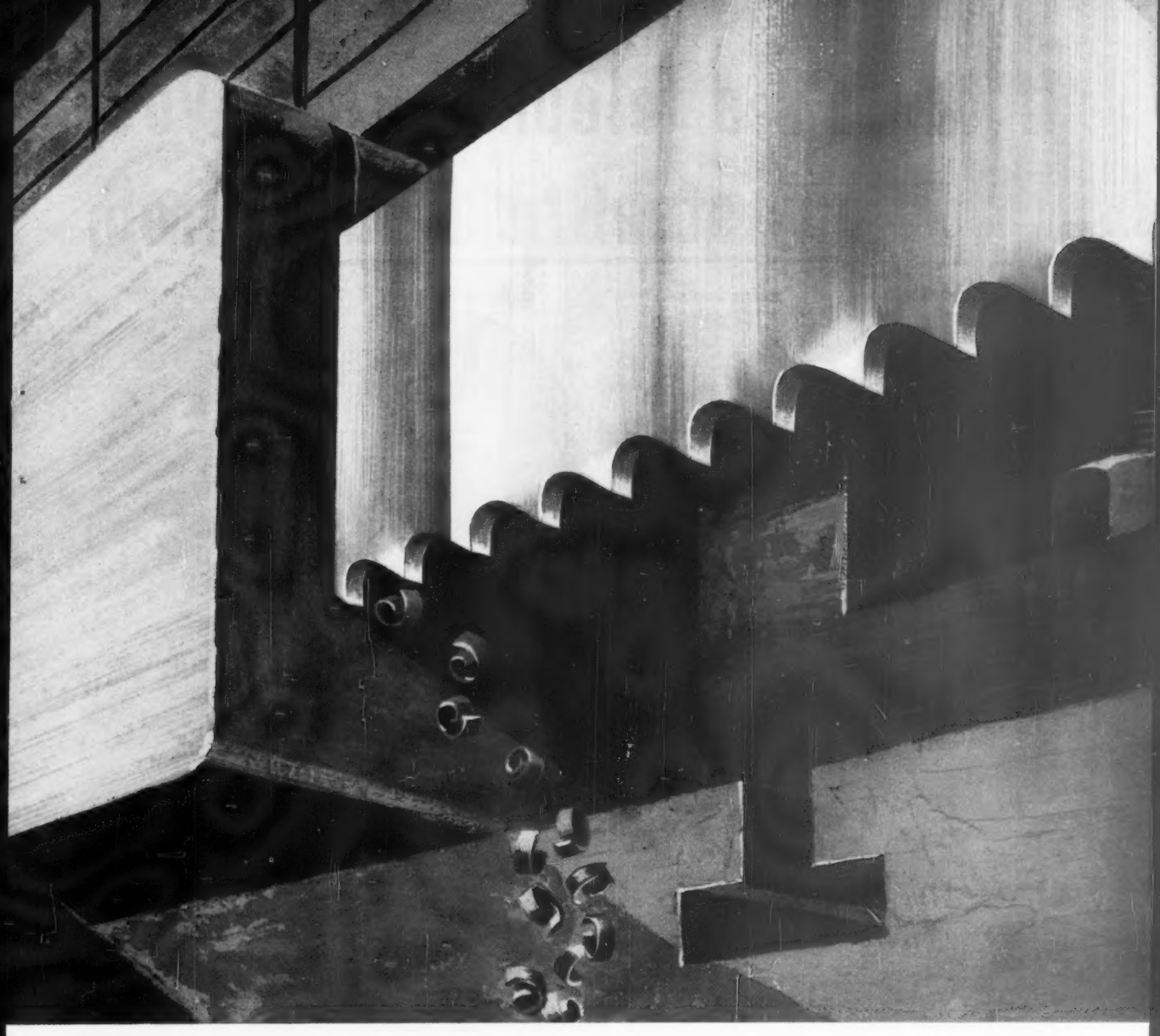
SIMONDS CIRCULAR SAWS

Tops for fast, straight cutting, Simonds Saws are designed and made to stay on the job longer — cut all types of metal — stretch your saw dollars.

SIMONDS MEANS SAVINGS WHATEVER YOU CUT

Up to three

with Simonds



times Longer Blade Life

SUPER High Speed Steel Band Saw

A proven fact! No matter what ferrous metal you're cutting, Simonds New SUPER High Speed Steel Band Saw Blade will give you *up to 3 times better performance* than any other high speed steel blade you're now using.

It's the biggest advance ever in metal cutting band saw blades! An entirely new concept — with new steel, new manufacturing methods, new heat treatment, new welding techniques, even new final inspection.

So startling are the performance records this new SUPER High Speed Steel blade is setting, we're offering it to you on a *Performance Guaranteed* basis.

Big savings are also being made with Simonds Standard High Speed Steel blades. Each in its proper application gives you money-saving features no competitive blades can match.

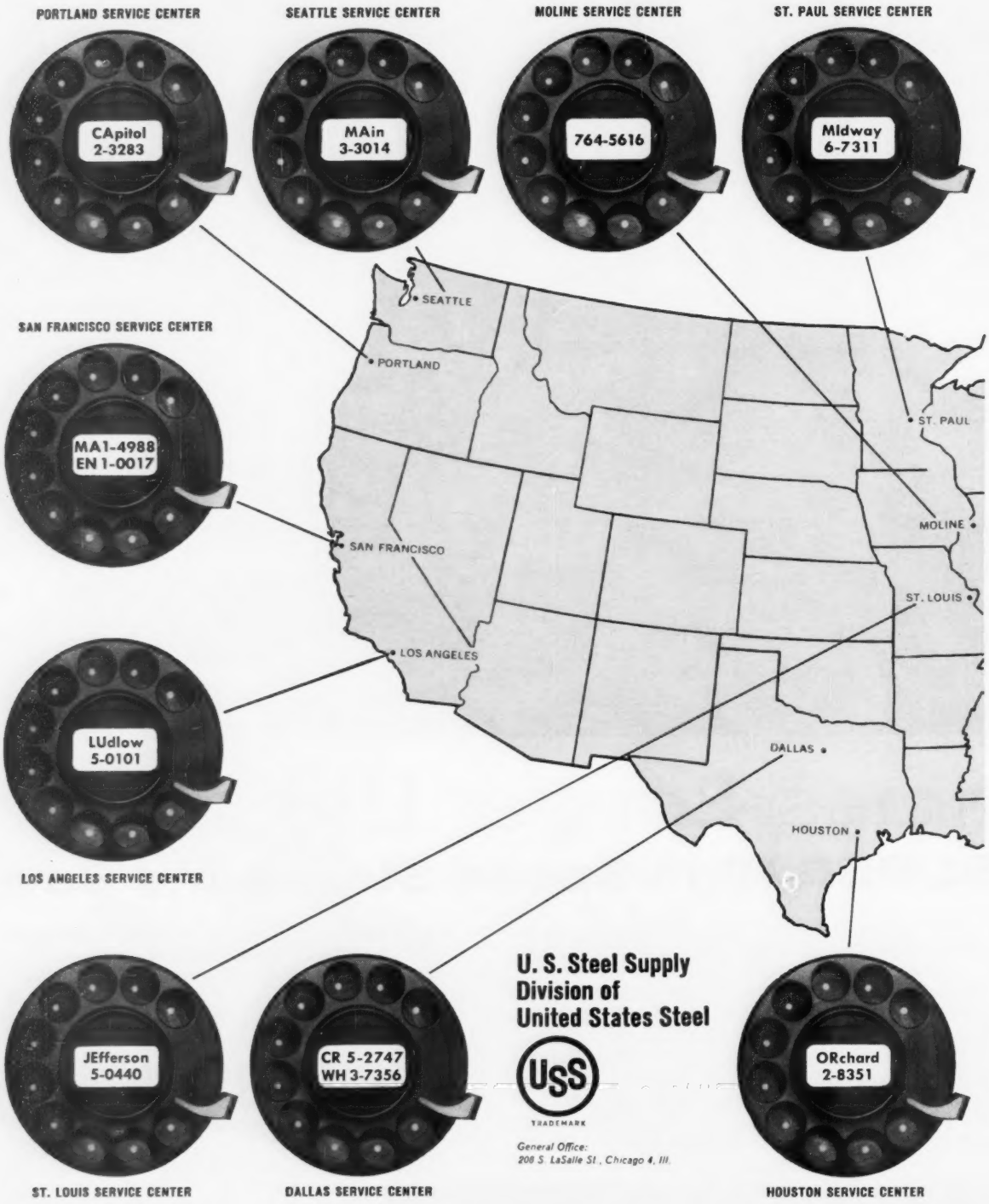
Call your local Simonds Distributor for prompt delivery or additional information.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASSACHUSETTS

Buy through your local Simonds Distributor for "TRIPLE-S-SERVICE" — Local Stocks — Local Speed — Local Skill

Factory Branches in Union, N. J., Chicago, Shreveport, La., Los Angeles, San Francisco, Portland, Ore. • Canadian Factory in Granby, Que. • Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Heller Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Philadelphia, Pa. and Arvida, Que., Can.

If there's a telephone near you, any steel in a hurry from

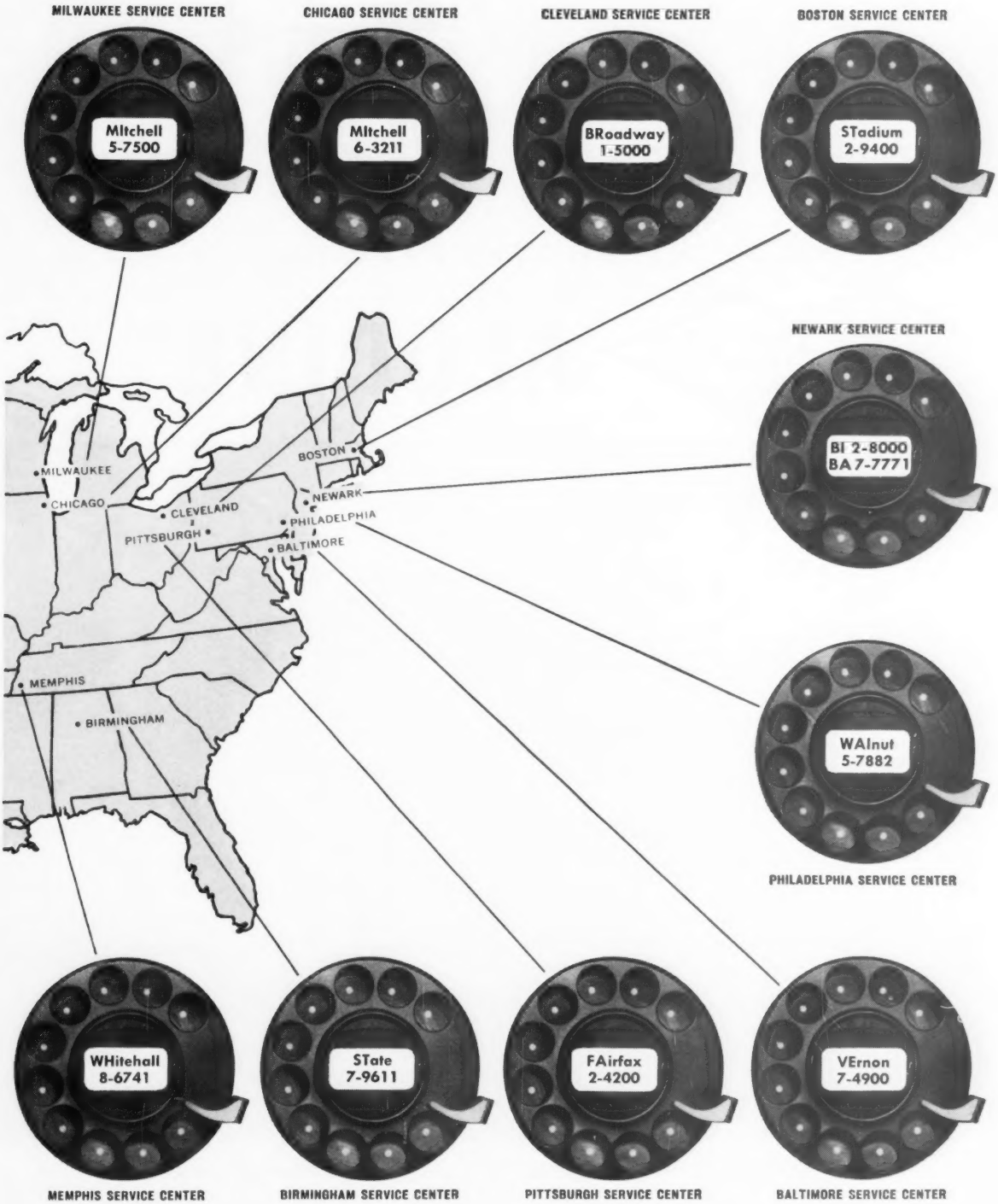


U. S. Steel Supply
Division of
United States Steel

USS TRADEMARK

General Office:
208 S. LaSalle St., Chicago 4, Ill.

you can get USS U. S. Steel Supply



PRODUCT BY ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

PROCESSING BY NSE

PRE-PAINT PROTECTION BY

AMCHEM **ALODINE***

A typical Alcoa Alumalure building siding installation is shown in the clean, functional lines of the Robinson Building, Elyria, Ohio.

How Amchem Pre-Paint Treatment, NSE Processing Help Put the "Lure" in Alcoa Alumalure!**

Alcoa Alumalure baked enamel finish on industrial roofing and siding sheet has made a startling impact in building circles. A low cost, decorative, maintenance-free exterior wall surface, available in 11 colors, it is widely used for new buildings as well as remodeling older structures.

Key to Alumalure success—strong, light aluminum and design innovations by Alcoa . . . precision finishing by NSE Signs & Stampings . . . unmatched protection and paint adhesion by Amchem Alodine chemicals.

With color matching standards a prime-requisite, assurance of paint adhesion on Alumalure sheets is a vital necessity to protect customers who buy the product, months later reorder and expect exact color match. Results to date on millions of square feet of Alumalure processed—no paint failure or rejects involving chemical treatment by Alodine!

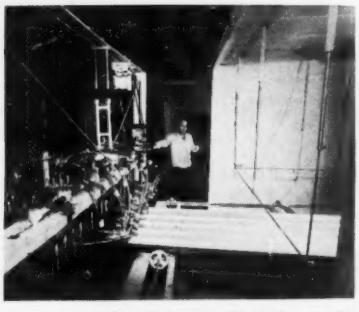
Rigid quality control has resulted in a fine production record for Alumalure at NSE's Birmingham plant.

Full time NSE and Alcoa inspectors watchdog every foot of sheet throughout the production cycle. For chemical pre-treatment Alcoa specifies high standards of Government Specification MIL-C-5541. NSE selected and uses Alodine for "the best metal preparation treatment you can find." NSE management states emphatically, "There's no question about what Alodine has done for the preparation of aluminum for painting. We don't have paint failures. We don't have customer rejects."

An "extra" plus from Alodine—Alcoa finds additional customer appeal in the gold coat Alodine creates on Alumalure backing which provides a pleasing antique decorative finish for building interiors.

If you want—corrosion resistance, lasting paint adhesion, rejects slashed to the vanishing point and sales ammunition that helps sell products—investigate Alodine, the industry's first and today's standard conversion coating chemical for aluminum!

* Amchem's trademark for its conversion chemical coating for aluminum.
** Trademark of Aluminum Company of America.



After treatment with Alodine, a ribbed siding sheet is painted employing Ransburg electrostatic paint equipment. NSE can run two sheets in tandem, accomplishing 60-lineal feet per minute painting.

NSE Executive Vice-President John Montgomery (left), Plant Manager R. Cater Lee, and Alcoa (quality standards) specialist J. Shea (right), inspect "3D" Alumalure sheet.

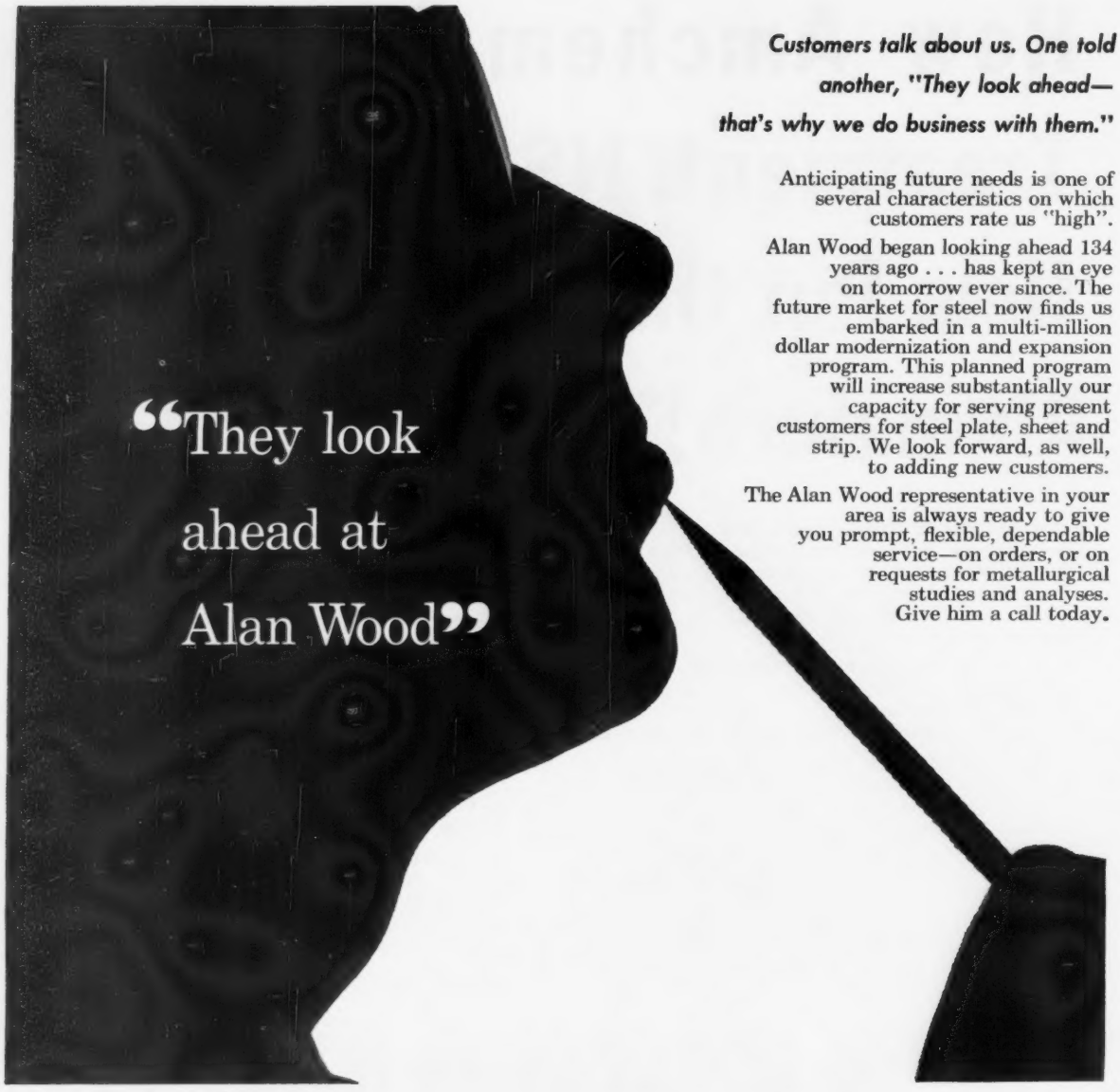
The massive equipment shown here is an ultra-modern, newly installed Lanly oven for handling Alumalure sheets.

AMCHEM

ALODINE

Amchem is a registered trademark of
AMCHEM PRODUCTS, INC. (Formerly American Chemical Paint Co.)
AMBLER, PA. • Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.

Write for free bulletin 1424C, outlining the uses and many different types of Alodine available for aluminum fabricators and processors.



Customers talk about us. One told another, "They look ahead—that's why we do business with them."

Anticipating future needs is one of several characteristics on which customers rate us "high".

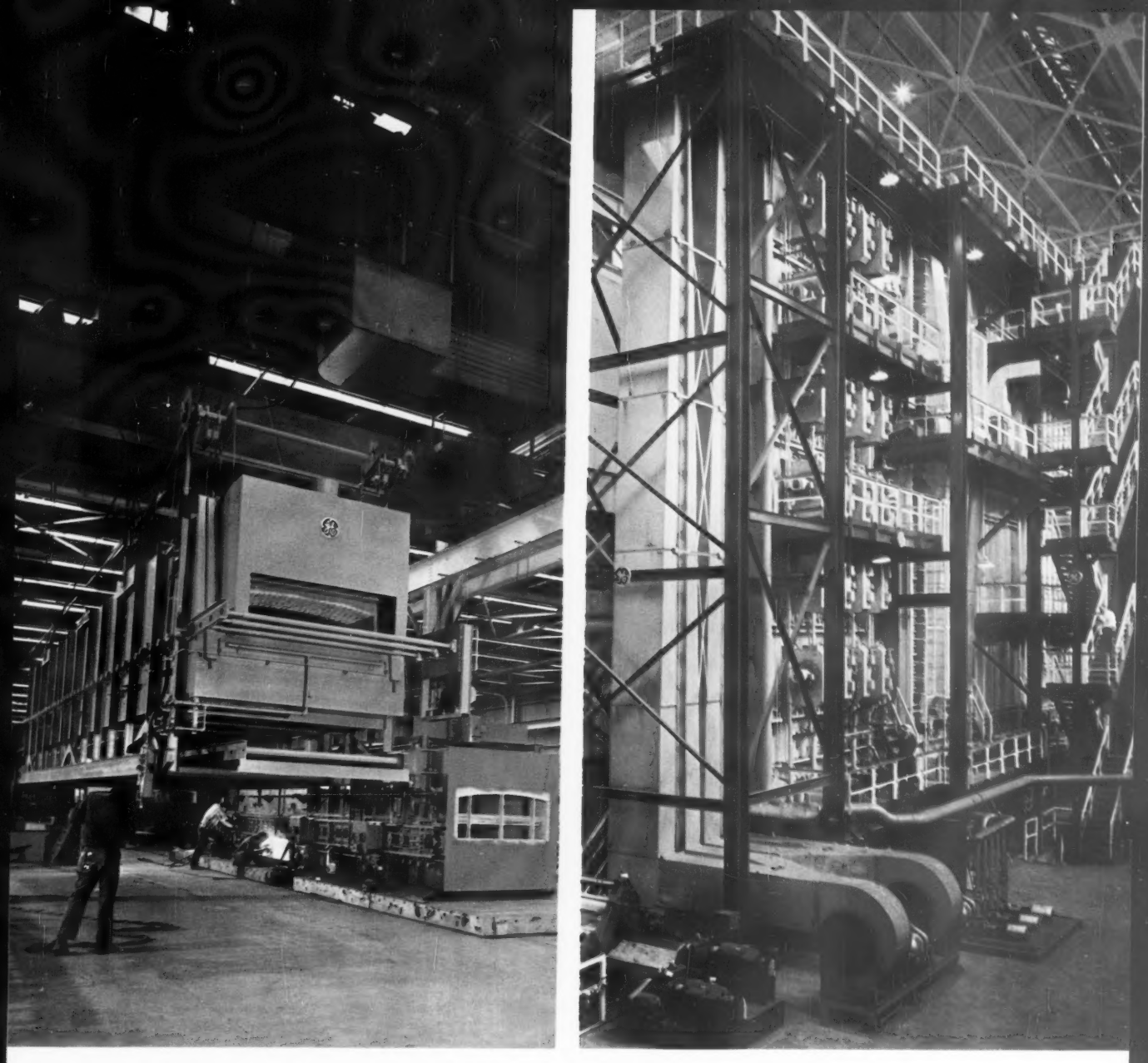
Alan Wood began looking ahead 134 years ago . . . has kept an eye on tomorrow ever since. The future market for steel now finds us embarked in a multi-million dollar modernization and expansion program. This planned program will increase substantially our capacity for serving present customers for steel plate, sheet and strip. We look forward, as well, to adding new customers.

The Alan Wood representative in your area is always ready to give you prompt, flexible, dependable service—on orders, or on requests for metallurgical studies and analyses. Give him a call today.

ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • **STEEL PRODUCERS WITH THE CUSTOMER IN MIND**

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited



Spacious Shelbyville, Ind. plant allows complete assembly of large furnaces (left) and sub-assembly of major components for units too large to ship assembled.

HEAT
from General Electric

How General Electric saves you furnace assembly dollars . . . speeds start-up

From smallest lab furnaces to largest tower furnaces, gas or electric, you can save both time and money by having all or part of the assembly done in General Electric's Shelbyville, Indiana plant. G.E.'s spacious, modern factory has facilities to assemble the largest equipment which can be transported to the installation site.

Your savings are greatest if the entire furnace is assembled in the G-E factory. There's less interference with your operations; you hire less part-time labor; and your furnace is assembled by experienced specialists, directed by design engineers.

Even if your equipment is too large to ship assembled, you can still save by having major sub-assemblies fabricated in the G-E plant, then shipped to your site for final erection. Either way, General Electric provides supervision or complete installation at your plant.

Example: By having major sub-assemblies manufactured in the General Electric plant, an Eastern steel mill was able to start up a 100-foot long, 65-foot high G-E continuous furnace just over four months after construction began.

For fastest, most economical furnace installation, take full advantage of G.E.'s "added value" of factory assembly. Call your nearby General Electric Apparatus Sales Office. 721-33

GENERAL ELECTRIC

For General Time Corporation

PRODUCTION ANSWERS FALL INTO PLACE, SAVE $56 per 1,000 UNITS WITH SCOTCH-WELD®

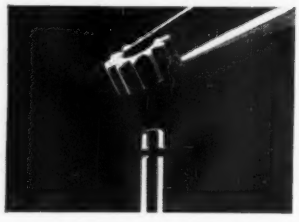
BRAND STRUCTURAL ADHESIVES

Before a SCOTCH-WELD Brand Structural Adhesive joined the assembly line, attaching tiny gear heads to mounting pins was a tedious and costly operation for Haydon Division, General Time Corporation, Torrington, Conn. High-temperature brazing frequently distorted gear configuration, warped shafts, upset metal hardness. A 100% inspection, with rejects aplenty, was required to assure watch-like accuracy in the final product—synchronous timing motors.

A 3M Field Engineer suggested SCOTCH-WELD EC-1386. In production, bonding gears to shafts with this epoxy-type adhesive eliminated the distortion-causing heat problem, ended high rejects, made 100% inspection unnecessary. The void-filling properties of EC-1386 reduced tolerances required between shaft and gear. And best of all, savings of $56.37 per thousand assemblies resulted!

Chances are your company can save money, speed production, simplify putting new designs into production by taking advantage of SCOTCH-WELD Structural Adhesives or other adhesive products developed by dynamic 3M research. Ask the nearby 3M Field Engineer to show you how! Or write AC&S Division, 3M Co., Dept. SBEE-11, St. Paul 6, Minn.

"SCOTCH-WELD" is a reg. TM of 3M Co.



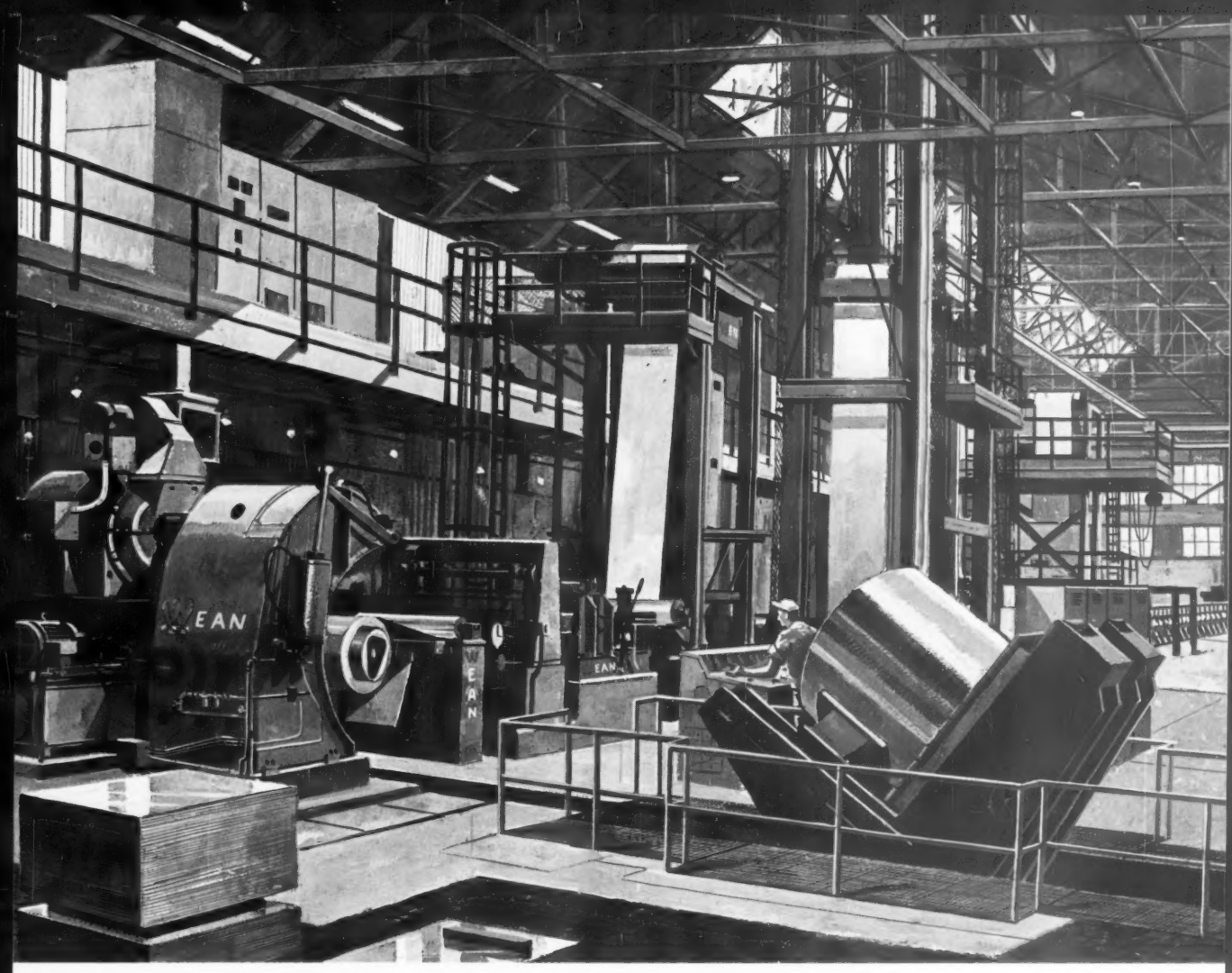
SCOTCH-WELD EC-1386 simplifies bonding gear to shaft by eliminating high brazing heat that distorted the tiny parts, changed metal hardness.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY



PORTRAIT OF PROGRESS: *Wean No. 2 Alkaline Tinning Line at Granite City Steel Company's Granite City Works*

Granite City Increases its Range of Tin Plate Widths with New Wean Alkaline Line

To supply the full range of coil widths required by the can manufacturing companies it serves, Granite City Steel Company recently installed this Wean alkaline-type tinning line.

Capable of handling coils up to 40,000 lbs. with an outside diameter of 72", this line is designed to process tin plate at speeds up to 1200 fpm. The line can accommodate strip from 18" to 38" in width and from .003" to .015" in thickness.

The new Wean line has been designed to economically produce differential plating, providing more versatility in meeting customer requirements. Strip storage is provided in looping towers at both the entry and exit sections of the line in order to maintain constant flow of material through the processing section.

During its three-decade partnership with the steel industry, Wean Engineering Company has designed more than 80% of all electrolytic tinning facilities in operation today. We invite you to put this experience to work on your next tinning line project.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO

*Important Cost-Reducing News from 30 Years of Research and Production of High-Strength, Furnace-Treated Steels!**

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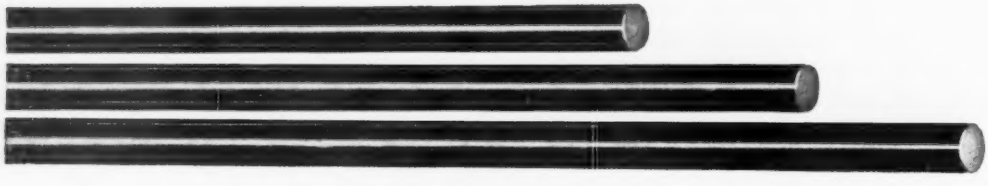

BLISS & LAUGHLIN MONEY-SAVING Strain-Tempered®

COLD FINISHED STEEL BARS

* Eliminate Heat-Treating Costs
* Save In Grade and Processing Extras
* Pay Only For the Grade Needed

Bliss & Laughlin again brings you another benefit of its long-range product development program—ALLOY Strain-Tempered bars to supplement an extensive line of CARBON Strain-Tempered bars. The cost-saving advantages are significant!

IF YOU USE HEAT-TREATED ALLOY BARS, you can save up to 30% in processing extras by switching to Bliss & Laughlin Strain-Tempered Alloy bars. Strength and hardness are equal. Machinability is comparable. Ductility is somewhat lower, but adequate for many applications. Size limitations depend on individual specifications. With Strain-Tempered Alloy bars, it is frequently possible to select a grade with a lower grade extra than is possible with heat-treated alloys, thus saving additional money.

IF YOU HEAT TREAT ALLOY STEEL PARTS, Strain-Tempered Alloy bars may meet your hardness specifications at lower cost. In addition, problems of distortion and finish associated with heat treatment are eliminated. Strain-Tempered Alloys can be tailored to hardness in the 30 Rockwell "C" range and up to 40 Rockwell "C" and higher in some combinations of size and alloy grade. Ductility and impact properties, while lower than in heat-treated alloys, do not impair performance in many applications.

IF YOU HEAT TREAT CARBON STEEL PARTS, Bliss & Laughlin Strain-Tempered Carbon steel bars will provide equivalent strength and hardness, with adequate ductility and toughness. You save heat-treating costs, reduce fabricating time and eliminate costly operations formerly required to correct distortion of parts in heat treatment.

IF YOU NOW BUY C-1144 STRAIN-TEMPERED OR COMPARABLE TRADE NAME STEELS, a review of your machining operations may indicate costs can be reduced by switching to a lower-cost, less-machinable grade. We'll gladly send a chart showing comparative data. By selecting the grade providing only the machinability needed, you do not pay a premium for machinability you do not use. Savings can range up to $24.00 per ton.

RESEARCHED AND PRODUCED FOR 30 YEARS. High-strength, furnace-treated steel bars were pioneered by Bliss & Laughlin 30 years ago. They are backed by nearly 70 years of experience in producing all grades of cold finished steel bars that can be used profitably by customers. In 1929, the first Strain-Tempered bar was produced for automobile drive shafts. By 1931, Bliss & Laughlin supplied 75% of one automotive company's requirements. Today Bliss & Laughlin is furnishing large quantities of standard alloy grade Strain-Tempered bars for drive shafts, as well as for many other purposes requiring high strength. A notorized certified report on the chemical and physical properties accompanies every Strain-Tempered mill shipment, evidence of the exacting quality standards which you can expect from Bliss & Laughlin.

You will be money ahead asking a Bliss & Laughlin representative to analyze your present use of high-strength alloy and carbon steels. He will recommend without obligation, the most suitable, least costly alloy or carbon grade from Bliss & Laughlin's extensive line of Strain-Tempered bars.

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GENERAL OFFICES: Harvey, Ill. • MILLS: Harvey, Detroit, Buffalo, Los Angeles, Seattle, Mansfield, Mass.

Leading Independent Producer of Cold Finished Steel Bars

WHEN YOU SPECIFY GRANULAR REFRACTORIES

CAPACABILITY OF THE SUPPLIER IS BASIC

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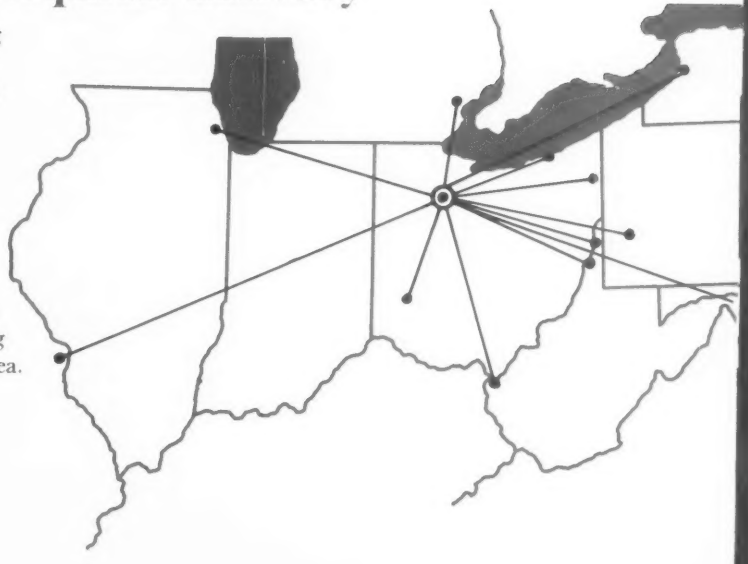
basic's capacity and ability to provide steelmakers with better granular and tar-bonded refractories

with capacability...quick delivery

Almost exactly in the heart of steelmaking America, Basic's main plant at Maple Grove, Ohio ships refractories virtually at the flick of a finger. Its strategic location on two rail lines—at the junction of the Pennsylvania and Nickel Plate Railroads—is another reason why *you can look to Basic* as a quick and absolutely dependable source of supply.

For the convenience of Midwestern steelmakers Basic maintains a distribution center at Hammond, Indiana . . . providing delivery within minutes to the Chicago area. Extensive facilities at Gabbs, Nevada serve Western steel producers with a complete line of magnesia refractories.



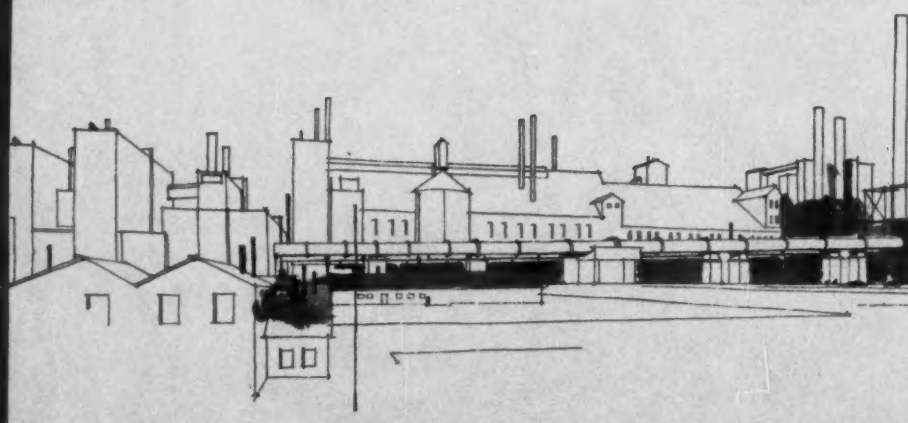
ability basic's with b

DEAD-BURNED DOLOMITE

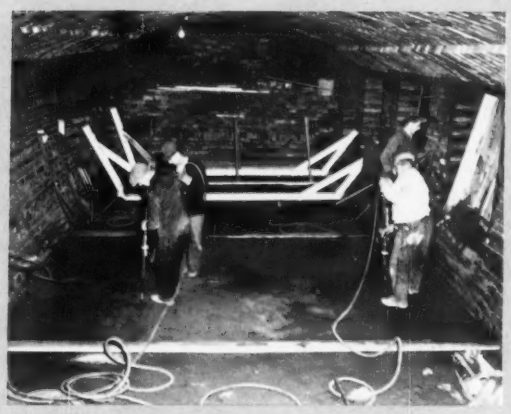
Basic's dead-burned dolomites, MAGNEFER and SYNDOLAG are used for routine furnace maintenance in virtually every open hearth and electric shop in the country. The reasons: uniformly high quality and outstanding performance—the result of continuous control during manufacture . . . carefully washed ore . . . accurately sized grains . . . precise blending and burning.

BASIC GUN REFRACTORIES

Such outstanding Basic gun refractories as GUNDOL and GUNMIX have contributed immeasurably to quicker, less expensive furnace maintenance. In many cases refractory costs are cut in half, with less labor and downtime . . . using only one material for both slag line and furnace wall maintenance.

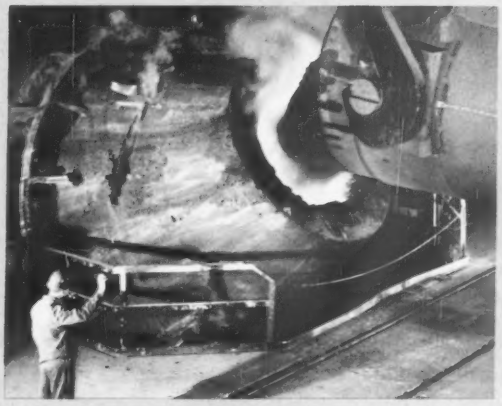


's vision to supply steelmakers better refractory products



SPECIAL MAGNESIA REFRACTORIES

Basic's ramming refractories, RAMSET and RAMIGLASE have become the standard of comparison for open hearth and electric furnace bottom performance. Steelmakers know they can depend on Basic's proven ramming mixes for both original hearths and hot and cold furnace maintenance. Other easy to use maintenance materials like SHOVELPATCH save furnace time and extend lining life.



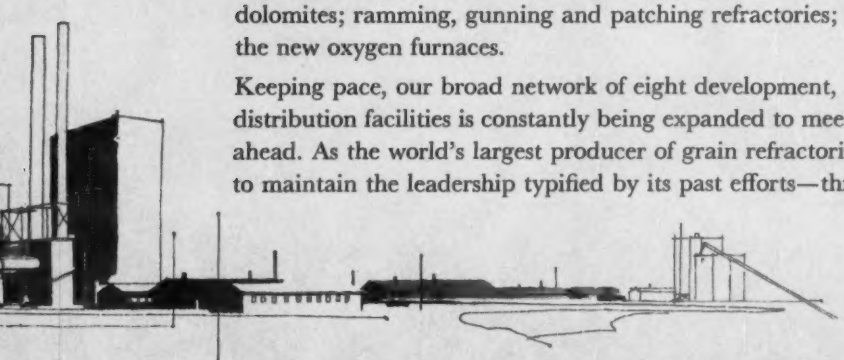
TAR-BONDED REFRACTORIES

Basic's tar-bonded refractories, TARBLOK and TARMIX are comprised primarily of dead-burned dolomite from Maple Grove and/or dead-burned magnesite from the company's Gabbs, Nevada facilities. Produced in a special plant, Tarblok and Tarmix are shipped to practically every oxygen steel producer in the Western hemisphere.

basic reflects capacability...

the *capacity* to manufacture and deliver quality refractories—the *ability* of talented and creative people to do a better job through vision, resourcefulness and skill. With capacability, Basic better serves the changing needs of steelmakers with a complete line of more than thirty hearth lining and maintenance materials—dead-burned dolomites; ramming, gunning and patching refractories; and tar-bonded linings for the new oxygen furnaces.

Keeping pace, our broad network of eight development, manufacturing, and distribution facilities is constantly being expanded to meet the challenging decades ahead. As the world's largest producer of grain refractories, Basic will continue to maintain the leadership typified by its past efforts—through capacability.



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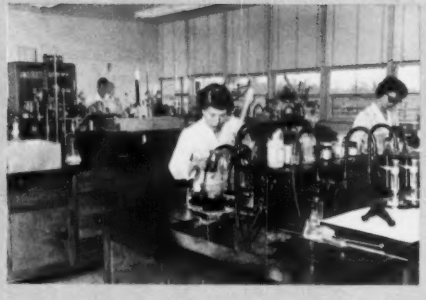

Basic's capacability in research and development

Basic's research *capacability* goes back to the early 20's when the company established one of the first laboratories in the refractory industry. The rewards of Basic's continuing research have been the development of virtually every major grain refractory innovation: the first scientifically prepared dead-burned dolomite; introduction in the U.S. of magnesia ramming mixes for hearth lining; the first commercial basic gunning refractories and pneumatic guns specifically designed for furnace maintenance. Six years ago Basic's lining refractories were used in the first U.S. oxygen steelmaking furnace.

These milestones of leadership reflect Basic's *capacability*—its *capacity* and *ability* to solve practical problems . . . to spearhead the development of refractory technology for a dynamic steel industry.

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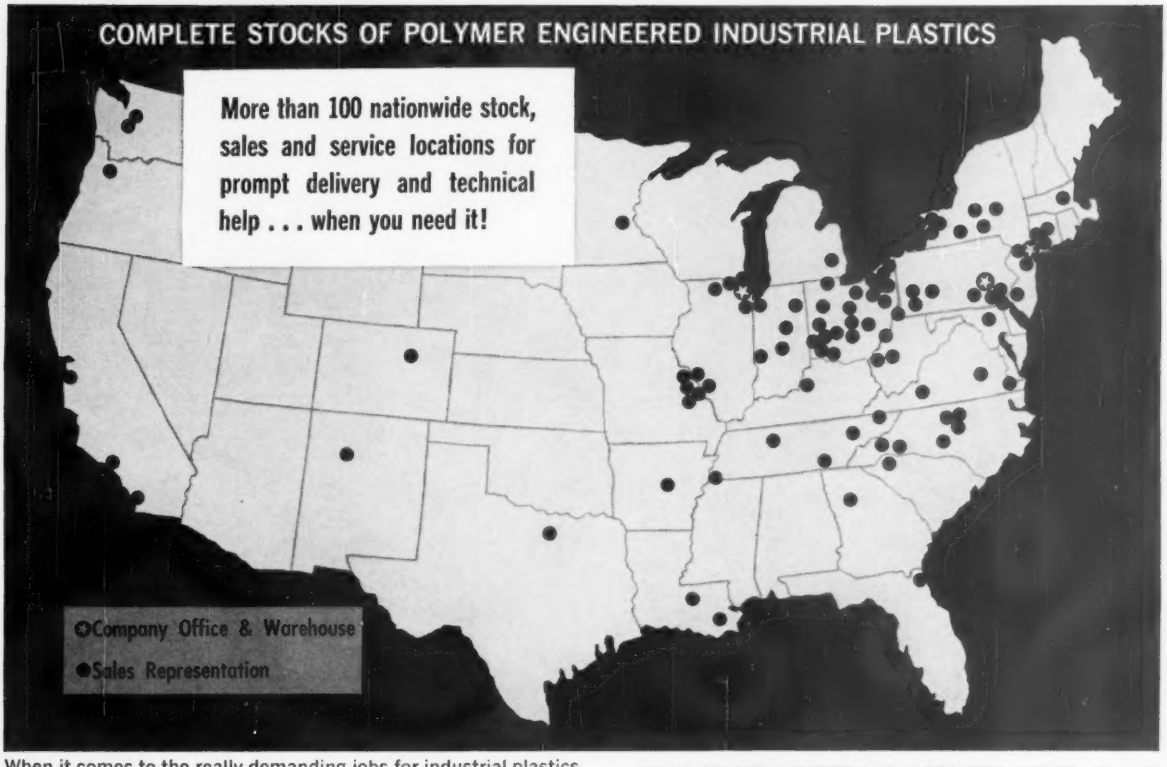
POLYPENCO

AT YOUR BACK DOOR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More than 100 nationwide stock, sales and service locations for prompt delivery and technical help . . . when you need it!
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When it comes to the really demanding jobs for industrial plastics —where deviation from the highest uniform quality may mean trouble—it pays to specify POLYPENCO. Solve your problems of in-plant production and end-product reliability today with the consistent high quality of POLYPENCO plastics, processed for uniformity in physical, chemical and electrical properties.

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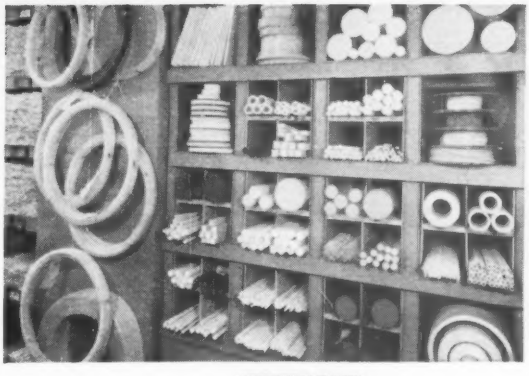

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POLYPENCO Q-200.5 (cross-linked styrene)
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POLYPENCO Polycarbonates

Sintered Plastic Parts

FLUOROSINT® Sintered TFE
FERROTRON® Ferromagnetic Materials
NYLASINT® Sintered Nylon

Molding Resins

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†Trademark Du Pont
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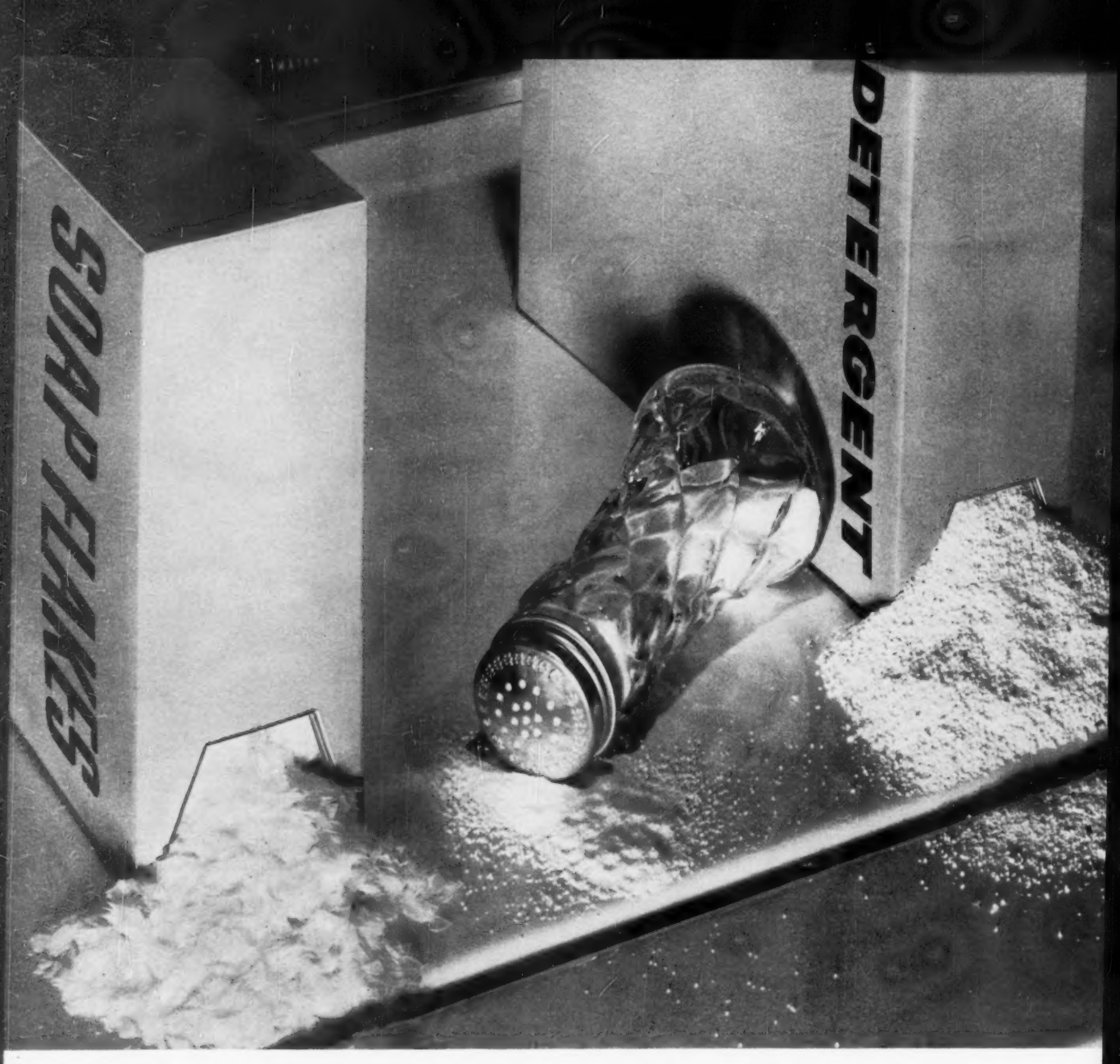

The finish that stands up under spills

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Whatever your finishing requirements, Glidden will formulate a finishing schedule to give you exactly the protection you specify to meet any service conditions—corrosion, staining, impact, abrasion, heat and cold.

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No matter what your products, process, or problem, Glidden finishes plus Glidden Technical Service can provide the answer.

Profits Are Patriotic

Several thousand of you queried by this magazine have rated the profit squeeze as your No. 1 business problem.

You are gravely concerned about the dip in net income in metalworking generally, and, more particularly, with the difficulty of maintaining a reasonable profit in your own operation.

Metalworking margins have sagged sharply during the past decade—even while gross sales figures have been rising.

Today, the problem of maintaining a healthy profit is being compounded by an increase in price fighting, by stronger competition from abroad and from nonmetallic products, and by the continuing upward push in labor and other costs.

That situation prompted the editors of STEEL to devote this year's Program for Management to the problem of improving metalworking's earnings position. A series of twenty-five articles will bring you the best thinking of some of the industry's most successful executives. Here will be explored cost management, means for overcoming foreign and domestic competition, and ways to tap hitherto unexploited markets.

We agree with you that restoring profits to reasonable levels is one of the great issues for business in the 1960s. A paragraph from the article in this issue, Page 71, keynotes the series:

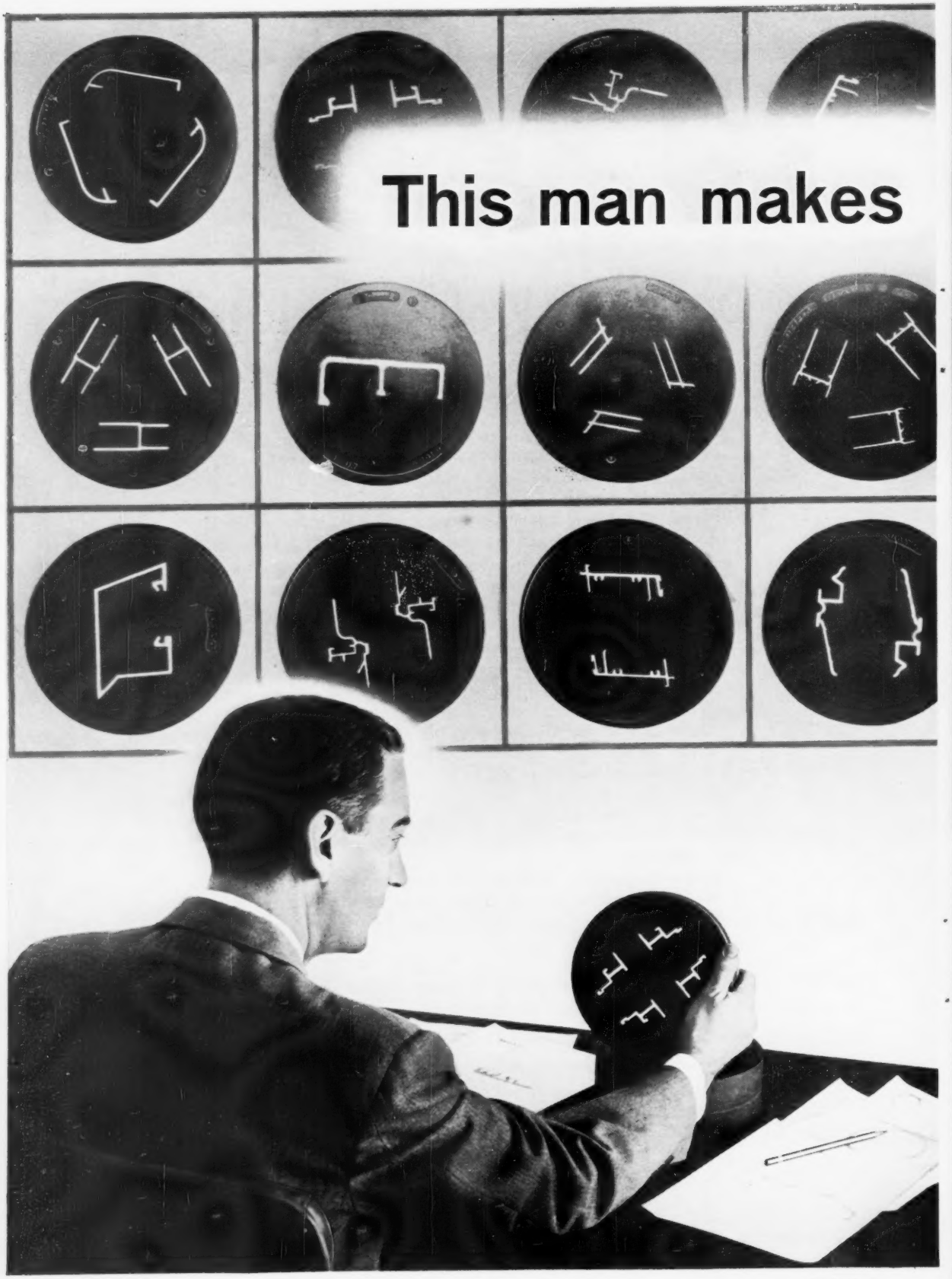
"Profits are the key to expanding job opportunities, to providing the tax revenues for our burgeoning public needs, to our long term rate of economic growth—and even to the survival of free enterprise in today's economic war between nations."

Profits are patriotic. And they are the business of all managers.

We hope—and believe—the ideas offered in this program will be helpful to you.

Walter J. Campbell

EDITOR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A specialist in aluminum and in the extrusion process, he can be a big help in engineering and design . . . producing the precision-made parts you need to your most exacting requirements. As for alloys, he offers you a wide range of aluminum alloys formulated by Aluminium Limited for specific end-product requirements.

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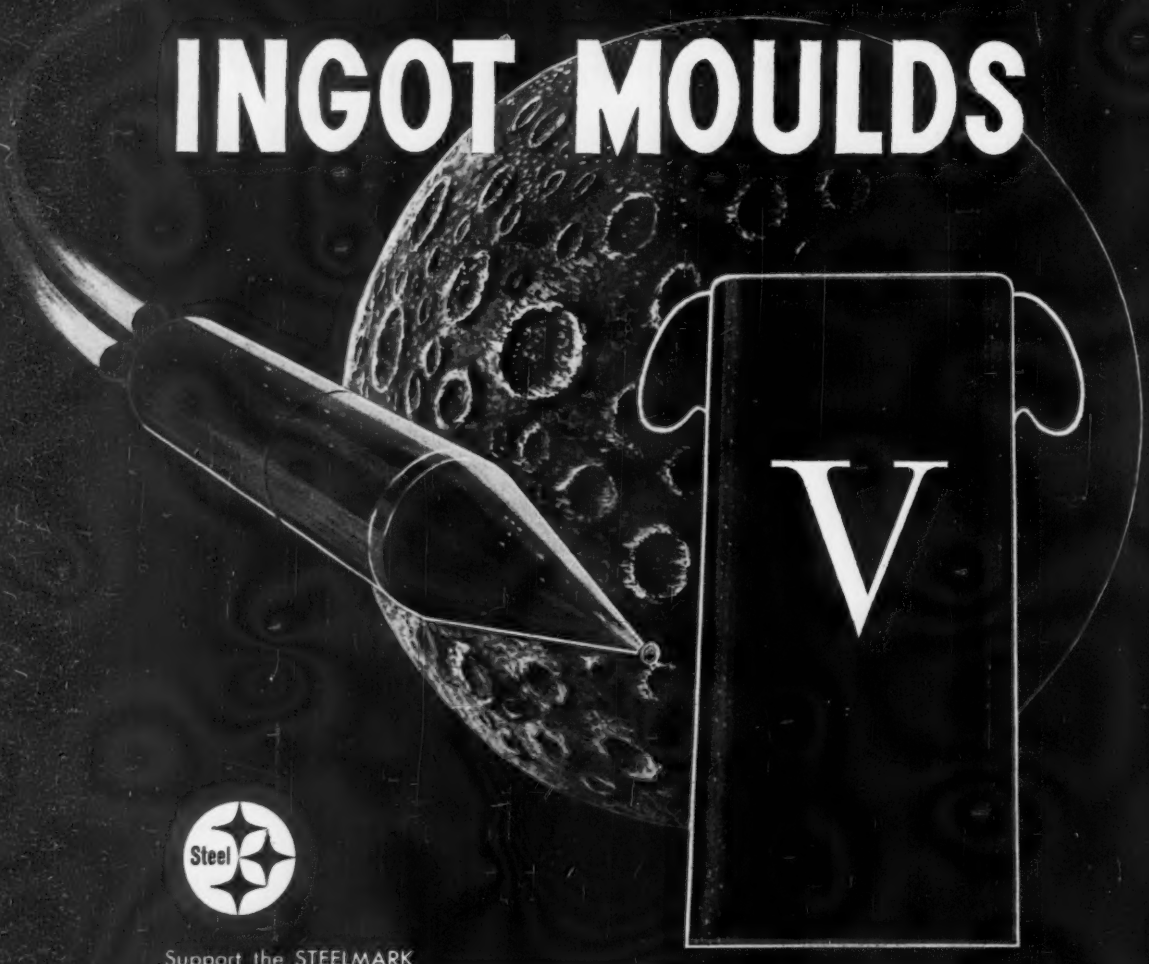

Steel

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Does Arthur Goldberg's entry into the tugboat-rail strike signal . . .

More U. S. Pressure Coming in Bargaining?

THAT'S THE QUESTION industrial relations managers were asking themselves last week after Labor Secretary Goldberg helped mediate a settlement in the New York tugboat strike.

Perhaps a partial answer was given when Mr. Goldberg was asked if his participation could be regarded as setting a precedent for government intervention in labor disputes.

He replied in effect: The administration's action was an expression of concern about a strike which directly involved the flow of interstate commerce. It was simply a matter of lending the good offices of the government to settle serious disputes in the public interest.

One possible inference from those words: The government will enter a labor-management dispute when those conditions exist.

The government's action in the tugboat strike closely followed two other important announcements on the labor relations scene:

1. The recommendation by Kaiser Steel Corp.'s Long Range Committee that it be set up permanently (including public members) and meet regularly to promote harmonious labor-management relations (STEEL, Jan. 23, p. 27). Under the proposal, public members can be asked to sit in on negotiations as observers, participate in mediation efforts, and issue a public report on the negotiations.

2. The Livernash Steel Report on bargaining in the steel industry was released. Initiated by James Mitchell, former secretary of labor, and co-ordinated by Harvard Professor E. Robert Livernash, the report concluded: The impact of the steel strikes has been exaggerated.

• **Wrong Impression**—What does the prospect of more government intervention and more public representation do to the outlook for bargaining?

The sentiments of many executives are echoed by Owen Fairweather, labor consultant with the Chicago firm, Seyfarth, Shaw, Fairweather & Geraldson: "There's an illusion being built up that the public is needed to referee negotiation contests between management and labor. It's a distorted picture, tending to make management the adversary who's always holding out."

• **Pressure Already There**—Management is already under pressures to come up with a balanced settlement in negotiations, points out Mr. Fairweather. Labor wants higher wages. Stockholders (who often outnumber employees) want a fair return. And customers want price levels to be held.

The Livernash report stresses: Early government intervention to avoid a work stoppage often turns the parties away from face-to-face bargaining at what is normally the most fruitful time for settlement in the negotiations. It causes the parties to modify their appraisal of issues in the light of what the government may do.

The major fear about public representation is this: It's only a step away from having such a committee participate in other management decisions. "You'd be delegating authority to people who have no re-

sponsibility in the company," lamented one vice president.

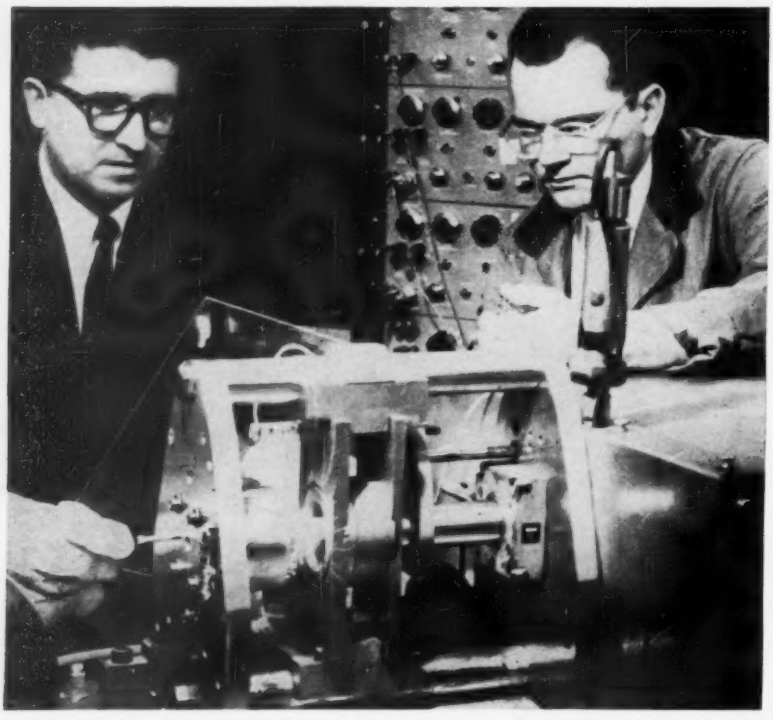
• **What's Needed?**—Many observers think Labor Secretary Goldberg will be promoting more labor-management conferences. He'll get plenty of support for local level meetings, but he won't get support for summit type conferences he advocated earlier. "Summit meetings are doomed because members on each side often take positions designed for public relations effects, not for real study," claim the opponents. "Summitry in labor-management relations will undercut the effectiveness of local bargaining," comment officials at Associated Industries of Cleveland. "It will lead to further erosion of the employers' rights."

• **Present Practice**—Many firms can point to concrete results gained at company level union-management meetings. Clark Equipment Co. managers, for example, meet periodically with union officials for a "Good and Welfare" session.

"They are not regularly scheduled meetings," emphasizes Bert Walter, vice president. "We don't want them to become commonplace. However, either the union or management can initiate a G&W meeting. The objective is not to handle grievances but to discuss a specific potential problem area and find a solution before it develops into an official grievance or bargaining table issue."

Examples of issues that might come up: Plant executives may feel that union committeemen are spending too much time off the job for union activities. Or union members may feel a supervisor is pushing his men too hard (perhaps the result of a cost reduction program). Conceivably, such matters could develop into grievances. But solutions can often be worked out via open discussion at a G&W meeting.

Mr. Fairweather and others who point out the value of such meetings warn managers to guard against one pitfall: Don't let the meetings slip into a method of securing union permission to make a decision. The line between good communications and a union-management decision can be a thin one.



FRICTION WELDER helped these men determine factors needed for sound welds in mild, alloy, and stainless steels, and several nonferrous metals. The machine twists two shaft ends together producing enough heat to melt the metal and form a fluid layer. Work is being done by Central Research Laboratory, American Machine & Foundry Co., New York

Plasticsmakers Aim At Another Record

PRODUCTION of plastics will reach 6.5 billion to 6.8 billion lb in 1961, a 5 to 10 per cent increase over the estimated 6.2 billion lb turned out in 1960, predicts the Society of the Plastics Industry Inc., New York. That will be the ninth consecutive high record for the industry. Production totaled 5.9 billion lb in 1959 and 4.5 billion lb in 1958.

Last year, polystyrene exceeded 1 billion lb for the first time to join polyethylene and the vinyls which passed that mark in 1959. In 1961, production of polystyrene increased about 5 per cent, polyethylene 12 per cent, and vinyls 4 per cent. The other major plastic material showing an increase was polyester, used principally for reinforced plastics, up 8 per cent.

While thermoplastic molding, identified mainly with consumer items, increased about 15 per cent last year, thermosetting molding, used mainly for industrial items, declined nearly 10 per cent.

The extrusion industry, involving such products as sheets, rods, tubes, profile shapes, and weather stripping, increased 20 per cent. In moldmaking, sales were up around 18 per cent.

Study Suggests Ways To Improve Price Statistics

The National Bureau of Economic Research has completed a study of federal price statistics for the Budget Bureau. (Consumer and wholesale price indexes are examples.) The Budget Bureau told a Congressional committee: New commodities should be introduced into the indexes more promptly; a more comprehensive consumer price index is needed to cover the entire population; and prices for the wholesale price index should be collected from buyers, not sellers.

'New Frontier' Comes into Focus

THE FIRST ten days of action by the new administration spell out the "new frontier" President Kennedy talked so much about in his campaign. The order of things to come:

1. Passage of depressed areas legislation.

2. Grants to the states for the extension of unemployment compensation.

3. School construction, housing, and other domestic pump priming.

4. Trade policy revisions.

5. A decision on depreciation reform.

• **Trade Is the Key**—The President is anxious, say observers close to the inner circle, to come up with a trade policy which will cement our relations with our allies, make new friends for us among the underdeveloped countries, and meet any new Russian economic challenge. But before he can make the specifics of his trade intentions known, he must rid himself of domestic problems brought on by the recession and enhanced by rising foreign competition.

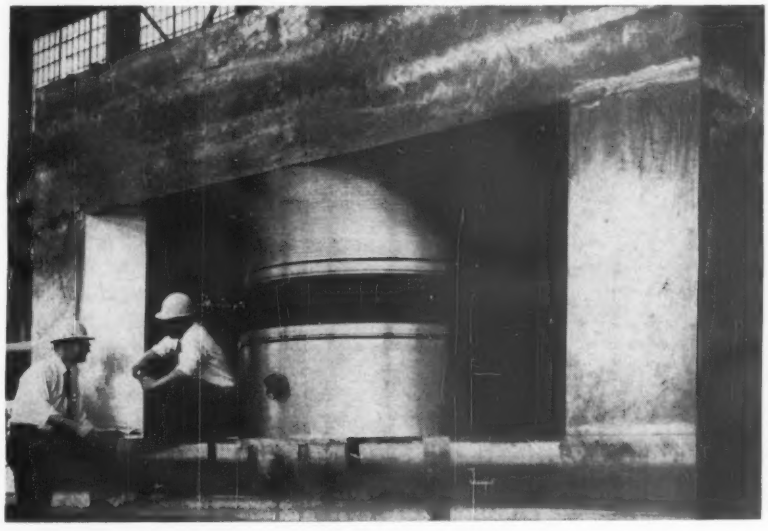
The key to his intentions is in a still secret report on trade policy by George Ball, under secretary of state for economic affairs. The report, say informants, parallels the Magnuson trade policy report which has been released by order of the President (see Page 68). Radical as the Magnuson report is, it leaves undefined the Kennedy formula for assisting domestic localities and industries. Amplification is expected in the form of a special message to Congress within a month.

• **The Big Look** — As plans now stand, the Kennedy administration will come to Congress with an overall growth pattern for the nation's economy that's designed to insure prosperity. (Inflation is a subject the Kennedy insiders are not talking about.) The plan will include the pump priming already indicated by Sen. Paul Douglas (D., Ill.) in his area redevelopment bill (S. 1). Other action expected will cover school construction, housing, some public works, and a system of inducements for retraining workers who have lost jobs because of technological advances or foreign competition. Inducements to industry to relocate plants in blighted areas or diversify away from products directly competitive with imports from friendly countries may get attention.

President Kennedy hopes that by taking the big look at domestic economic problems and getting Congress to handle them quickly, he will be able to guide his foreign trade policies through a conservative Congress. Instead of asking for what he thinks he needs in the way of trade policy and foreign aid money, he will ask for much more than he expects to get, knowing that Congress must cut down his requests to look good back home. (That was something the Eisenhower administration never learned to do.)

• **Ultimate Goals**—Besides the recommendations of the Magnuson report, look for the President to go all out for a five year extension of the Trade Agreements Act (it expires in 1962) and the right to cut tariffs across the board where he sees fit. Such legislation will be difficult for Congress to swallow, but it is sweetened by the hope of domestic prosperity. A special dish for business: The promise of depreciation reform if its lobbyists on Capitol Hill don't struggle too hard against the "welfare state" approach to our economic problems.

Sen. George Smathers (D., Fla.) has proposed a five year writeoff depreciation reform bill (S. 580). It would allow a taxpayer to select any period of depreciation, so long as it is not less than five years on new machinery and equipment purchased after Dec. 31, 1960. The minimum period is three years on used equipment (at least two years old). Salvage value will remain the same as if normal depreciation had been used. Gain from the sale of rapidly depreciated property would be treated as ordinary income.



310 TON MAGNET CORE of a variable energy cyclotron, forged, machined, and assembled at Bethlehem Steel Co., Bethlehem, Pa., has been shipped to the Physics Department, University of Michigan, Ann Arbor, Mich. When put into operation in 1963, the cyclotron will be used for research on the nucleuses of the heavier elements

My idea of a good assistant, says Frank Pace Jr., chairman, General Dynamics Corp., is a man I can enjoy as a person, who . . .

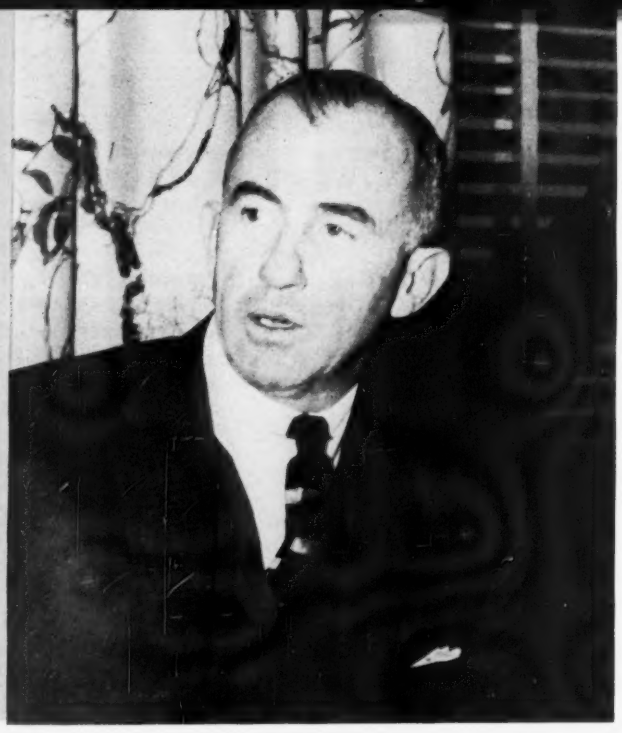
. . . displays leadership qualities.

. . . has a capacity to organize.

. . . is ambitious.

. . . has a broad background.

. . . can win the respect of my executive team.



Assistants to: What's Their Role?

EXECUTIVE BIRD DOGS, communicators first class, corporate troubleshooters, high priced clerks, the silent elite—those are some of the unofficial titles being bestowed upon the "assistant to," a growing corps of managers.

As high level aides to chairmen, presidents, vice presidents, and other key executives, their duties run the gamut—from serving as a sounding board for top level decisions to representing the boss on a Boy Scout council. No two "assistants to" have identical jobs—even when one succeeds another in the same company.

This general job description is made by Frank Pace Jr., chairman of General Dynamics Corp.: "Today's executive is called upon to do a great many things. A good assistant permits the executive to more effectively address himself to the vital issues of his responsibility."

In his role of taking some of the load off the boss's shoulders, he may, for example, assume these chores:

- Check the morning mail (from both internal and external sources) . . . and handle minor matters without consulting his boss.
- Answer outside telephone calls and see visitors the executive could not possibly accommodate because of the time factor.
- Keep tabs on internal meetings —making sure all executives know the times and places, why they're being held, what information and material they'll need.
- Read newspapers, magazines, government bulletins, and technical journals and abstract significant information to help the executive keep pace in his fields of interest.

Those are minor roles. The assistant to may be hired as an expert, a troubleshooter; the position may be used as a training ground for an up-and-coming young executive. The assistant to may also be an ideal place to speed up the indoctrination of a key man brought in from the outside; or in some instances, he may be used to fill a weak spot on the management team.

Troubleshooter

The assistant to is frequently a troubleshooter or special assignment man for the executive. Former professors, consultants, and other professional people are often tapped for such jobs.

Advocates claim: This individual, without line responsibility, can be cut loose and bulldog a project through in a minimum of time. The assignment can cover anything, from taking a year or two to check merger and acquisition possibilities to solving a pesky internal problem. The internal problem takes a man who is extremely diplomatic and persuasive because he generally has to seek co-operation and information from many other executives.

Because of his broad exposure to all functions and managers of a firm, the troubleshooter develops a "feel" for what's going on in the company. He can spot trouble in the embryonic stage. The capabilities of the individual are vital because there's a thin line between being the boss's gestapo and being an ef-

fective corporate citizen.

Tapping the Comer

Mr. Pace and other advocates of the assistant to regard the function as fertile training ground. "There are few areas in a company," stresses the General Dynamics chairman, "where an individual can obtain such valuable exposure to the company's over-all policies and operations, to the problems and decisions faced by its top executives."

Frequently, the position is a quick roûte to the top for the bright young middle or junior manager with special ability. In another job, he might be stymied because his superior is still relatively young or has little chance of moving upward soon.

Example: As the assistant to the president, the young manager might be told to investigate the feasibility of a data processing department for the company. After his assignment is completed, he may get the job of setting up the function. When the installation is in, he will probably take over as head.

Many firms have used such an approach in setting up an export sales activity or overseas operation.

Mr. Pace feels that a training period of four to five years is enough.

Bringing in New Blood

Although most firms prefer to promote from within, most also admit it's sometimes necessary to bring in an outsider to a top job. The assistant to title serves a dual role:

1. It gives the incoming manager a better chance to become acquainted with the company, its executives, its products, and markets.

2. It gives the president a chance to look over the manager; and it gives the manager a chance to prove himself.

Shoring Up a Weak Spot

Ask any executive or consultant how to treat a weak link in your management team and the quick answer will be: Remove it. Put in a strong manager. All too often it's not that easy—the individual's too young to retire or too old to retrain or fire. Any drastic move might upset internal relations; in a small community, external relations might be the key factor.

Although the practice is frowned upon by many executives, the assistant to function is solving the weak link dilemma for many companies. One Chicago assistant to the president is a former professor. "My interest is in the theoretical side of management," he relates. "I couldn't possibly tell our line managers how to make or sell our products. But the firm's weak link has been in the development of managers as well as over-all industrial relations. A substantial part of my job is to work with these managers helping them develop a better future management team."

Pitfalls

Most assistants to are keenly aware of the potential power and influence of their jobs, as well as the dangers to their bosses and companies.

Allen C. Siebens, 42-year-old assistant to Chairman Pace at General Dynamics, feels his job has two basic requirements:

1. An assistant to should stay in the background as much as possible.

2. He should be as tactful as possible.

"A key role of the assistant to is

In small and large companies, the role of the assistant to can be a key one . . . President Oscar Victor (left) and his assistant Tom McDonald exchange views on a key problem at Vic Mfg. Co., Minneapolis. The firm employs 200. Here are some of Mr. McDonald's duties:

- He edits the company newspaper.
- Heads the safety committee.
- Heads the suggestion committee.
- Answers president's correspondence and makes minor decisions in his absence.
- Conducts school for jobbers' servicemen.
- Designs work control systems for production, inventory, and purchasing.
- Prices all machinery and parts.
- Controls production and inventory and control departments.
- Supervises, follows up, and in various ways carries out the president's directives.

that of a communicator," stresses Mr. Siebens. "The higher up a manager goes, the more complex communications become. The assistant to can save his boss's time as well as that of other executives if he handles communications well.

"At no time should he try to create an 'authority image' of his own—that can only lead to strained relationships and loss of effectiveness among the company's executives."

Robert Trundle, Cleveland consultant, feels that too often top executives working 12 to 16 hours a day and weekends grab at the assistant to as a cure-all. "The basic problem generally lies with the individual and his method of operation."

He cites this case:

An overworked president of a fairly large Midwestern company called in Trundle Consultants Inc. to investigate.

One of Trundle's men discovered that the president was demanding (and getting) a volume of daily reports that would take the average executive two days to study and analyze.

Most of the reports were unnecessary; important reports had too much detail in them. Two other factors: As the company had grown, the president failed to build his management team and properly delegate duties. There were also two weak links in the management organization.

"Hiring an assistant to is not the solution in this type problem," stresses Mr. Trundle. "A strong assistant who could lessen the president's workload in that situation would probably upset proper organizational relationships. To be effective, the individual would have to function as an executive vice president, and that should be his title."

The next most common error, some claim, is that a high priced executive hires a high priced assistant and uses him as a male secretary.

Says Mr. Trundle: "A $6000 to $8000 man can do much to help lessen the workload effectively. Why pay $12,000 or more to get the job done?"

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

Heating Equipment Makers Look for 2nd Half Upturn

CAUTIOUS OPTIMISM for 1961 was the economic consensus expressed by members of the Industrial Heating Equipment Association Inc., at their winter meeting in Dearborn, Mich., last week. Backlogs, which were low last fall, are improving, but they are below the level of a year ago.

Most furnace makers are touting prompt action on quotations and deliveries. They expect a general upswing in business around the last half.

New IHEA president is Hugh J. Pugsley, senior vice president, Swindell-Dressler Corp., Pittsburgh, a subsidiary of Pullman Inc.

• **Foreign Interest**—Members of the association show a growing concern over foreign competition, saying there is more competition from overseas producers of standard units and components. Companies are going overseas to set up licensing arrangements, either for the production of foreign designs in the U. S., or to sell their own designs and know-how abroad.

• **Surplus Disposal** — Government disposal of surplus property was reviewed by John H. Williams, staff director, Production Equipment Division, Department of Defense. Under a new policy, all disposal for the Defense Department is centralized under the U. S. Air Force at Kelly Air Force Base, Tex. Surplus equipment is classified only as used or unused; the prospective purchaser decides on his own value of the equipment, said Mr. Williams. Little of the government's production equipment has been purchased since 1955. (Some Defense Department equipment, purchased before 1900, is still on the books as active and in use.)

• **Obsolescence Study** — The IHEA Technical Committee is working with the U. S. Navy's Bureau of Ships to develop an instruction manual for use in evaluating replacement of obsolete government equipment. The committee found that much of the government's equipment was obsolete and some of it unfit for use. In another effort, IHEA members are working with the Commerce Department to gather more market data on the furnace industry. A new survey for 1960 will be completed by June 30, 1961.

• **New Officers**—In addition to Mr. Pugsley, the IHEA officers for 1961 are: Executive vice president, Robert Fleming; vice president, T. H. Wickwire III, president, Trent Inc., Philadelphia; treasurer, R. R. Snyder, treasurer, W. S. Rockwell Co., Fairfield, Conn. New directors are: Mr. Wickwire; M. R. Ogle, sales manager, Drever Co., Bethayres, Pa.; and G. C. Wilsher, vice president engineering, Holcroft & Co., Detroit.

Computer calculates usage factors, keeps tabs on bearing stocks at 15 warehouses. It helps . . .

Take Guesswork Out of Inventory Levels

MANY MANUFACTURERS face a dilemma when they are figuring warehouse requirements: Overstocking ties up capital, while holding to minimum levels may mean the loss of a sale.

Here's how one company solves the problem: To plan its requirements, Norma-Hoffmann Bearings Corp., Stamford, Conn., uses a computer and a network of teletypes —one at each of the firm's 15 warehouses.

The system does these tasks:

1. Checks stock levels in each warehouse, compares the balance with a predetermined figure, automatically reorders.
2. Compiles stock summary for monthly inventory reports issued to distributors.
3. Answers customer inquiries on stock.

• **Programing Stock Level** — The key to the system is determining the operating stock level for each bearing in each warehouse. (The company stocks 4000 sizes and types of bearings.) The computer calculates a "usage factor" based on the number of bearings sold in a six month period. Each month, the factor is recalculated to reflect the sales results of the preceding six months.

When a transaction takes place, the computer compares the reduction in stock to the monthly average usage level, and if reordering is required, the plant's production scheduling department is notified.

• **Inventory Report** — Supplementing telephone and teletype inquiries is a 45 page National Warehouse Stock List. Prepared monthly, it enumerates stock on hand at each warehouse in the network. This permits a distributor to appraise the stock situation and, if necessary, draw from any of the other warehouses.

"In effect, the distributor has all Norma-Hoffmann warehouses serving him, and the odds on him closing the sale jump far ahead of the competition," says E. W. Mitchell, controller.

• **Case History** — Palmer Bearing Co., Cleveland, received a call from a local customer for six, No. 22217 bearings for urgent delivery. It was unable to fill the order from its shelves. A check was made of the National Warehouse Stock List, and the item located at Norma-Hoffmann's Denver warehouse. Delivery was made within 24 hours. In the past, the same transaction would have taken three days.

• **Cost of System**—The computer rents for $35,000 a year. In addition to warehouse control (which takes about 20 per cent of the computer's time), the computer is also used in production scheduling, quality control, order processing, and cost and payroll accounting.

New Tacks on Foreign Trade Hinted

● **Sen. Leverett Saltonstall: Congress must see that GATT negotiators "achieve genuine reciprocity"**

● **Sen. Warren Magnuson: "Foreign commerce is infinitely more than the business of commercial interchange"**

WASHINGTON OBSERVERS have two questions about Sen. Warren Magnuson's (D., Wash.) report on our foreign trade problems:

1. Does the report reflect the course President Kennedy intends to take in dealing with import competition?

2. Or is it a trial balloon? The President and the senator have discussed the study, and it was released to the public at the request of the President. (The senator is chairman of the Senate Interstate & Foreign Commerce Committee.)

The report leads with a right hook: "The U. S. has a clearcut interest in advancing the economic progress of non-Communist nations."

Then it follows with a jab: "The consequences of national policy must be generally shared."

The study offers a new phrase: "The trade adjustment principle." It's defined this way by the Commerce Committee staff: Import restrictions are regarded as the last means available to the federal government to protect the domestic manufacturer from foreign competition.

"The alternative remedy of adjustment assistance" would be considered first. It is described this way: "The resources of the government should be brought into play to assist an affected industry to improve productivity, move into new and more competitive lines, or otherwise adapt to the competitive situation without undue hardship."

The study recognizes the current business slump at home, but it concludes that the problem "can be met without destroying the values inherent in a constructive policy toward international trade." It adds: "The full thrust of domestic economic programs (must be) directed toward the correction of basic inefficiencies, technological obsolescence, low productivity levels, area blight, and similar weaknesses."

● **RECOMMENDATIONS**—What may become the Kennedy plan for boosting exports and living with imports is spelled out this way:

1. Promote exports, but don't do it in such a way as to harm other Free World economies.

2. Establish an "adjustment assistance" program for injured domestic industries.

3. See that peril point and escape clause procedures come after "adjustment assistance" is attempted.

4. Restrict "Buy American" policies to clearcut national security cases that involve surplus labor areas.

5. Liberalize import restrictions on nonagricultural raw materials until the present setup can be replaced. Also suggested: "A system of income guarantees on specified production levels" and the preservation of domestic resources which cannot be economically exploited." Method: "Moth ball status."

6. Remove the "six months' notice" requirement for the disposal of surplus commodities from our national stockpiles.

7. Administer the export control act "in stricter accordance with demonstrated Soviet technological and military capability and with the strategic export controls enforced by our allies."

8. Give the President power to relax import restrictions without reciprocity to bolster the economy of a nation "which falls victim to Soviet manipulation of trade."

9. Reassess trade restrictions with Red China in light of restrictions against other Communist countries.

10. Give the secretary of state more authority over trade policies.

● **SALTONSTALL PLEA**—Sen. Leverett Saltonstall (R., Mass.) also has some views on international trade. He believes GATT negotiators should take into account the fact that Western Europe and Japan have fully recovered from World War II. He asks that negotiators at this month's Geneva meeting remember the quotes, currency restrictions, and licenses other governments require on our exports. He seeks "genuine reciprocity" in our trade agreements with other countries.

Rep. Cleveland Bailey (D., W. Va.) goes much farther. He demands (in House Concurrent Resolution No. 4) that we "grant no further tariff reductions" at GATT meetings. He contends that at least 75 per cent of our gold losses are the result of trade agreements which are not reciprocal.

To Meet Customer Demands

New Side Trimming Line Installed In Tin Mill Will Improve Production Of Tinplate In Coils

Installation Called Most Modern Of Type In Industry

A new side trimming line to facilitate the production of tinplate in coils in Weirton Steel's Tin Mill Department was placed in operation recently.

W. H. Wright, Vice President and Chief Engineer, said the new installation, rated among the most modern pieces of equipment in the steel industry, was installed because of the increasing demand from customers for tinplate in coil form. The company will also continue to ship tinplate in the conventional cut sheets.

The new side trimming line, which began operating last month, and a second line, installed on an emergency basis, are used to trim the sides of the sheet steel before it is plated with tin, so it can be wound into coils and be ready for shipment as it comes off the tinning lines.

Mr. Wright explained that Weirton Steel's No. 4 and No. 5 tinplating lines have been equipped with edge control reels which insure that each coil is wrapped with a straight edge. This is necessary to prevent damage to the edges in bundling and shipping and also because straight edges are required when the coils are processed further by Weirton Steel customers.

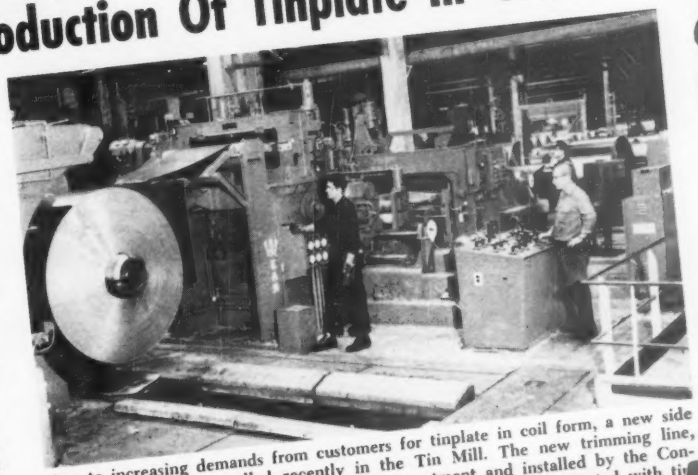
Mr. Wright also reported the installation of a new bundling line, which began operating about three months before the new side trimmer. The bundling line utilizes machinery to wrap coils in heavy paper and fasten them with steel straps. Formerly, this was a hand operation.

The side trimming operation takes place after the steel has been tempered to customer specification by the skin mills and before it is plated with tin. This process eliminates the waste which formerly resulted when the side trimming was done on the cutting lines, after the tinplating process.

The No. 2 side trimming line has a maximum speed of 4,000 feet per minute while the No. 1 line operates at a speed of 1,200 feet per minute. The No. 2 line is able to handle 30-ton coils 85 inches in diameter and 45 inches wide. The line also is equipped with a mash welder, a relatively new operation which provides a smoother weld that does not damage other sections of the coil as it is wound.

All of the new facilities were designed by the Weirton Steel Engineering Department and installed by the company's Construction Department.

Reprinted from Employees Bulletin, Weirton Steel Company, February, 1960



Due to increasing demands from customers for tinplate in coil form, a new side trimming line was installed recently in the Tin Mill. The new trimming line, designed by Weirton Steel's Engineering Department and installed by the Construction D[illegible] the [illegible] of sheet steel bef[illegible] ed with ti[illegible]

Once again—

proof that GPE Controls is the Steel Industry's "Partner In Progress"

The tin mill side trimming line at Weirton Steel Company, Division of National Steel Corp., was furnished by Wean Engineering Co., and equipped with the industry's most modern edge guide equipment—designed and built by GPE Controls, Inc.

Only GPE Controls offers steel mill edge guides with . . .

★ **Non-clogging sensing nozzles with lowest air consumption.**

★ **Unlimited force output with cylinder pressures to 2000 p.s.i., flows to 140 g.p.m and higher.**

★ **Variable-gain booster for simple screwdriver job-site matching of control system to speed, coil weight, etc.**

GPE Controls Model 300 Edge Control, as furnished to Weirton Steel Company.

Write for NEW Bulletin EG84, which tells all about GPE Controls web guiding systems—and be sure that GPE Controls are specified and furnished on your next strip and tin mill installation.

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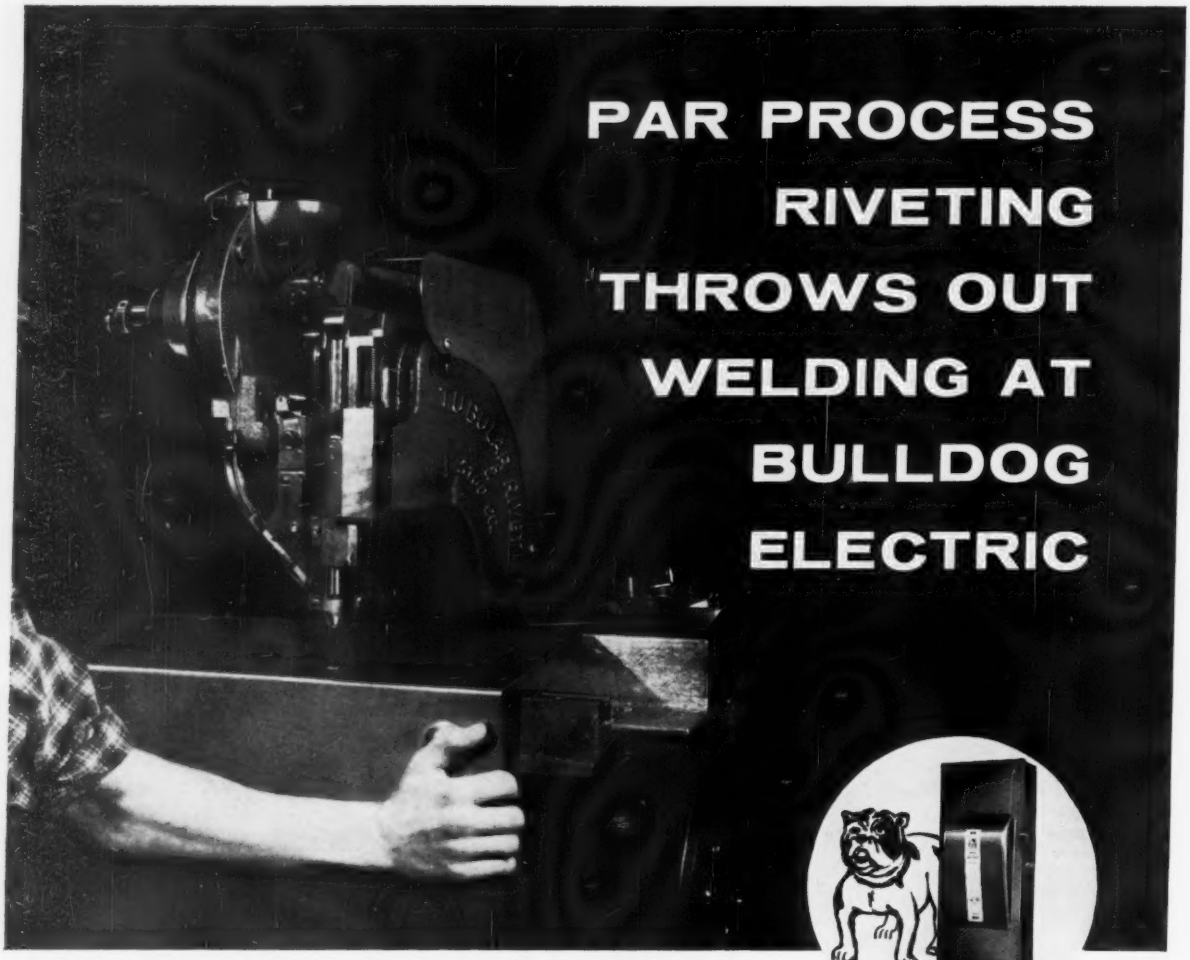

Cuts Assembly Costs 65%

At BullDog, TRS riveting replaced arc welding in assembling components of Vacu-Break® safety switch boxes . . . with an overall saving of 65% in assembly costs. Previously, twelve arc welds were used to secure the two spring stops and mounting rails of each switch box. Special fixtures were required to support parts in the box during welding, and after welding was completed the fixtures had to be dismantled. The entire operation was costly and time consuming.

Trained in the PAR Process approach to cost reduction, the TRS man saw that an automatic riveting set-up could be devised to simplify and speed the work. A roller support was designed to carry the weight of the box, and position the parts for twelve fast operations of a standard TRS automatic riveter. Other details of rivet design, tooling, and setting sequence were quickly solved with the aid of PAR Process know-how. Riveting produced an equally strong assembly and permitted visual inspection of fastenings to assure security.

FIND OUT what the PAR Process can save you
The PAR Process aims at lower costs and higher production rates. It starts with a sharp-eyed, production line search by your TRS man, for ways to eliminate or simplify and speed up steps in assembly. It is made effective by specially organized TRS procedures, backed by unique TRS developments in rivets and riveting machines.
The PAR Process may bring you better integration and fuller automation of assembly operations, or even a cost-cutting change in basic assembly method as with BullDog. Ask for a check of your operations. Whether your assembly jobs are simple or complex, it can be worth dollars to you.

Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

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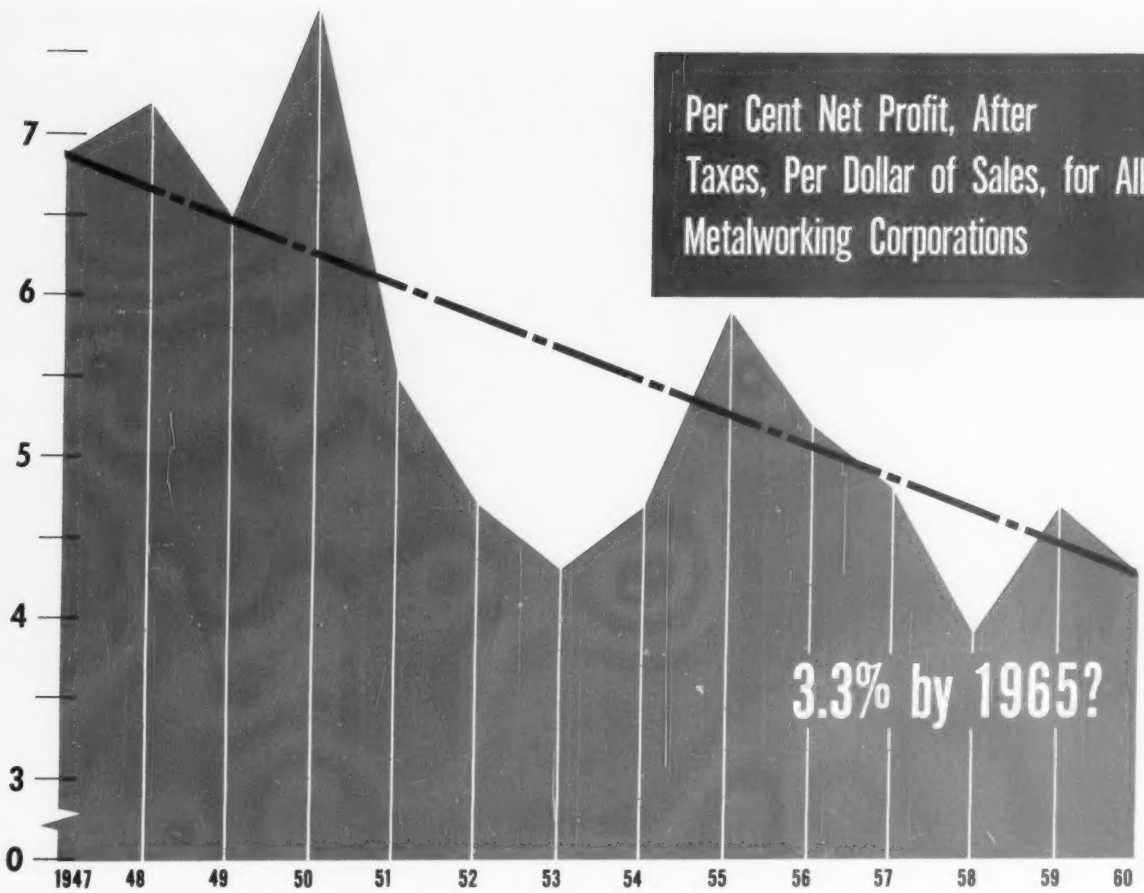


Why Profit Micromargins?

THE SADLY SAGGING trend line above illustrates metalworking's most pressing problem—the profit squeeze. If the trend continues, metalworking's profit per dollar of sales will be only half as great in the mid-1960s as it was in the late 1940s.

The trend must be reversed. Profits are the lifeblood of our free economy. Their level and trend determine the volume of future capital investment and outlays for research. Profits are the key to expanding job opportunities, to providing the tax revenues needed for our burgeoning public needs, to our long term rate of economic growth—and even to the survival of free enterprise in today's economic war between nations.

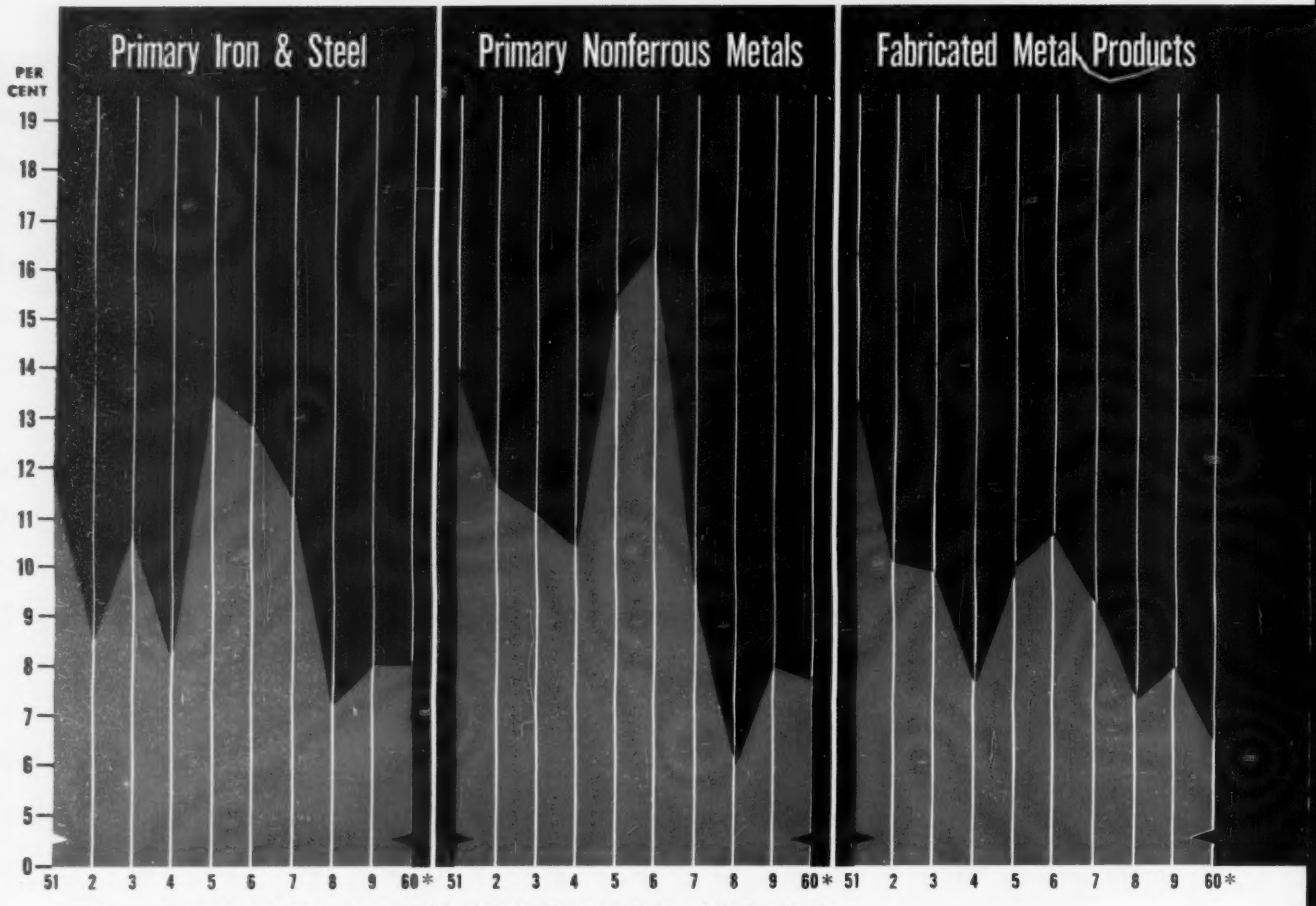
Unless we can restore the profit level to a reasonable point—noticeably above the current level in metalworking—it is likely we will be unable to meet our needs at home and the challenges abroad.

We don't want excessive profits that invite greedy speculation and distort investment decisions. But there is little danger of that in metalworking today. We do need —urgently—reasonable profits that will improve our rate of economic growth—which is now the lowest of any major industrialized nation.

● **Crisis**—In 1950, corporate profits (after taxes) equaled 9.5 per cent of national income. The figure shrunk to 5.6 per cent during the first nine months of last year (latest period for which figures are available).

In the early postwar years (1947-50), the average metalworking company earned 7.1 cents on every dollar of sales. But costs that climbed faster than productivity and taxes that skyrocketed have caused a

Earning Ratios Fall Dangerously



*First nine months. Charts based on data compiled by the Federal Trade Commission and the Securities & Exchange Commission.

downward drift resulting in average earnings of only 4.4 cents per dollar of sales during the last four years (1957-60). So, in one decade, metalworking's profit margins have narrowed by a whopping 38 per cent.

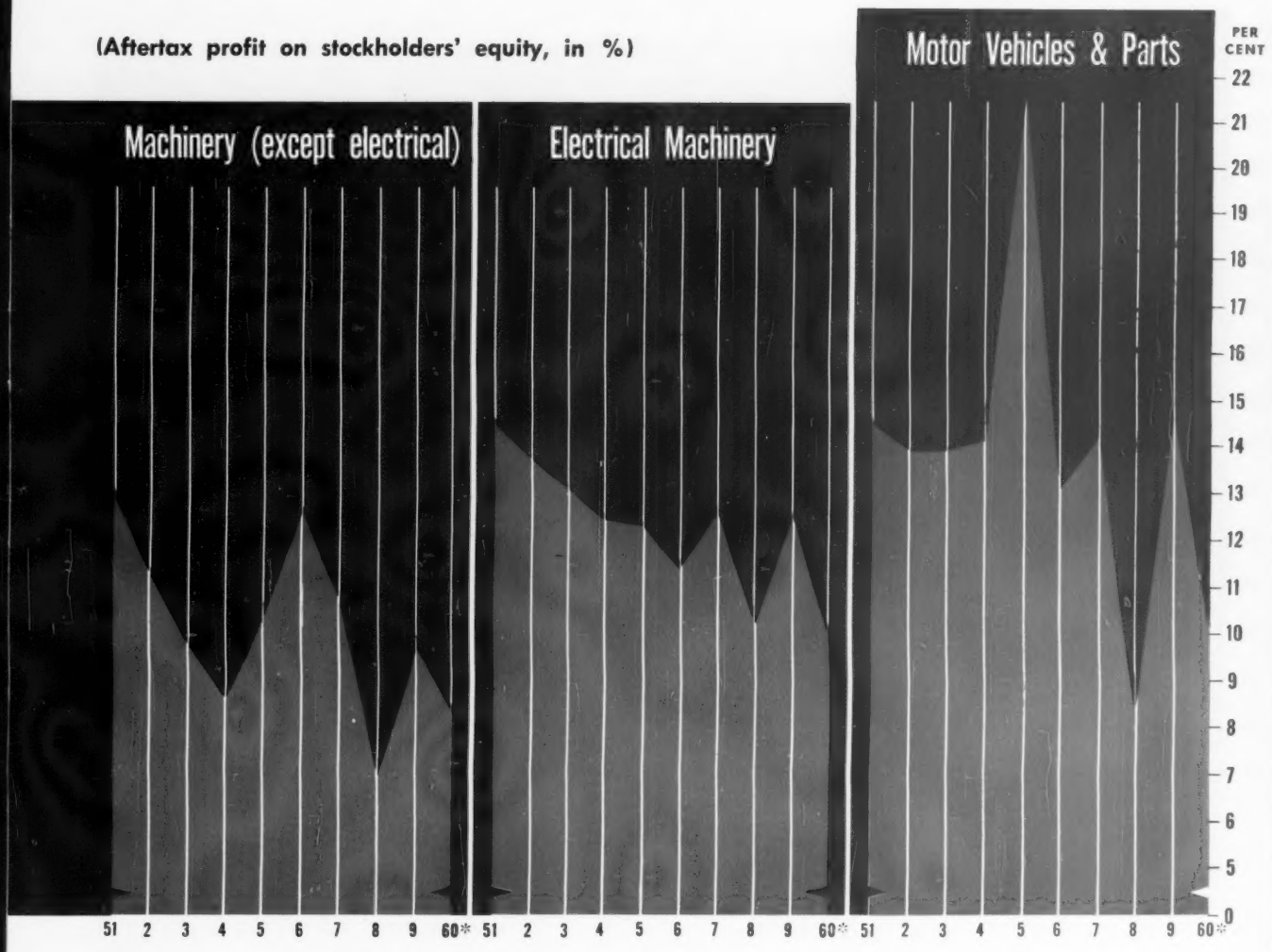
Even while chalking up record sales, metalworking has been accepting lower income. The crux of the problem lies in a lopsided distribution, during the last decade, of the fruits of increased productivity. Employees—from the president to the janitor—have received a disproportionate share—at the expense of sound, long term growth. William A. Steele, president, Wheeling Steel Corp., warns: The consumer and stockholder must get increased benefits from advances in productivity. If they do not, our competitive position will deteriorate—in the market for goods and in the financial markets. Says the First National City Bank of New York: "Companies are generating more and more income for others, but are able to keep only a small and shrinking share for dividends and reinvestment."

The bank compared the disposition of receipts by the 100 largest U. S. manufacturing corporations in 1949 and 1959. Its findings clearly illustrate the causes of the profit decline—and point up the danger in the trend:

- For every dollar received in 1949, the companies paid out 23.1 cents in wages, salaries, and benefits. In 1959, the employee's share had jumped to 27.5 cents.
- For every dollar of income in 1949, the companies paid out 6.4 cents in taxes. In 1959, tax outlays totaled 8.9 cents.
- For every dollar of income in 1949, the companies paid out 3.9 cents in dividends. The investor's share fell to 3.7 cents in 1959.
- For every dollar received in 1949, the companies retained 4 cents for reinvestment. In 1959, the amount retained was only 2.7 cents.

That final finding—the decline in the amount retained for reinvestment—is the most dangerous, because on that figure depends the rate of our economic growth. It takes industry to provide jobs; it takes capital to build industry; and it takes profits to develop and enlarge the capital supply. Management has paid too little attention to capital formation in recent years.

(Aftertax profit on stockholders' equity, in %)



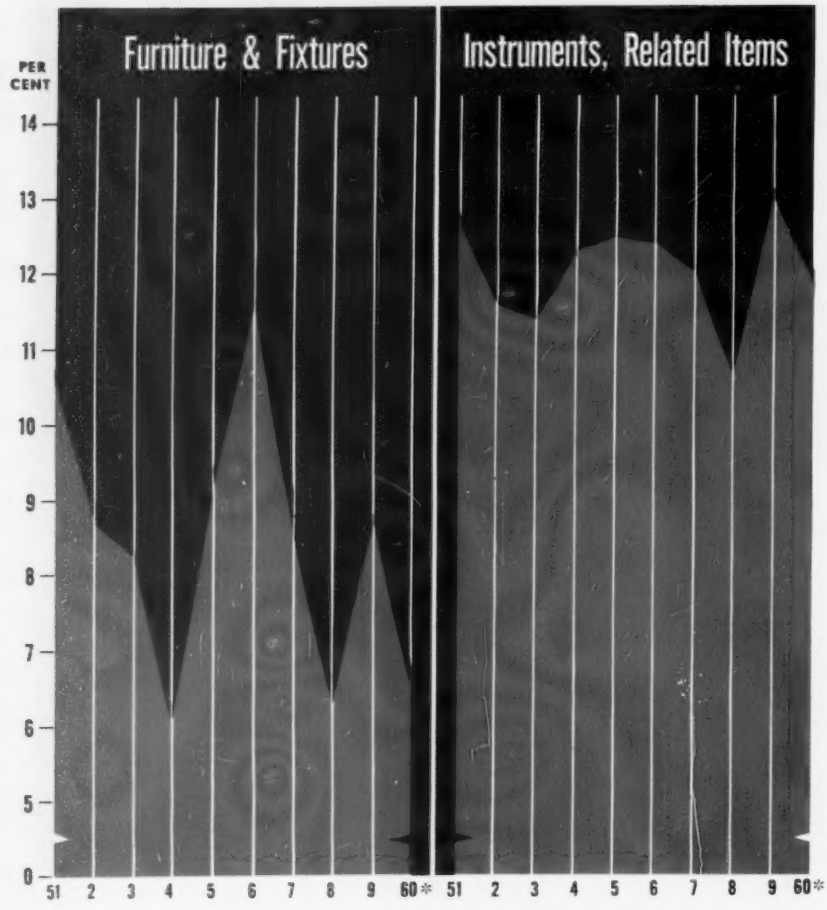
• **Capital Outlays**—First National City Bank of New York reports that 96 per cent of the plant and equipment outlays made during the last 13 years were covered by internal financing—retained earnings and depreciation allowances. The latter are becoming more and more inadequate as inflation and an increasing rate of obsolescence have caused them to fall far short of the amounts needed by industry to keep its facilities competitive with foreign rivals (whose governments have been more realistic about depreciation allowances).

So higher rates of profit are essential if industry is to raise productivity through investment in cost saving machinery. The resulting productivity gains can increase profits which can again be used to purchase even more productive equipment. Unfortunately, that cycle has been working in reverse recently: Low profits have prevented industry from buying new equipment; the old equipment has become even less productive, lowering profits even farther.

The New York bank hurls this challenge: "We have benefited so long from the savings-investment process that we tend to take it for granted. This is a serious mistake if we really want to accelerate economic growth and most particularly if we want an easier life with shorter working hours, more paid time off the job, and earlier retirements. We will need to give every encouragement to inventive genius and get machines to do more of the work for us. Machines do not get designed, built, repaired, and operated without dedicated effort. A nation gets in production what it pays for in toil and sweat, in human effort intelligently and efficiently applied."

• **Technological Gains**—The consumer pays our wages. If we want him to continue doing that, we must satisfy his wants. The better we are at finding his wants and filling them, the greater will be our volume of sales. And volume, even at a low profit per dollar, can bring about higher total profits. If we go a step beyond and give the customer added value, we can raise our prices and get an even greater return. The third step is to raise the value and lower the cost—via increased productivity—

(Aftertax profit on stockholders' equity, in %)



*First nine months. Charts based on data compiled by the Federal Trade Commission and the Securities & Exchange Commission.

Metalworking's Profit Rates Fall Below Most Industries'

(Aftertax profit on stockholders' equity for 12 months ended Sept. 30, 1960) (Percentages)

All manufacturing	9.5
Durable goods	9.0
Transportation equipment	**11.4**
Motor vehicles & parts	**12.9**
Aircraft & parts	**7.2**
Electrical machinery	**11.0**
Other machinery	**8.3**
Metalworking machinery	**4.9**
Fabricated metal products	**6.3**
Primary metals	**7.6**
Iron & steel	**7.6**
Nonferrous metals	**7.4**
Furniture & fixtures	**7.0**
Instruments, related products	**12.6**
Nondurable goods	9.9
Paper & allied products	8.9
Basic chemicals	11.7
Drugs	16.8
Petroleum refining	9.8
Rubber & plastic products	9.6
Apparel	8.0
Tobacco manufactures	13.0

so that profits rise even higher.

Metalworking is now in the midst of technological breakthroughs that will offer tremendous opportunities to raise productivity, fill consumer needs, and accelerate industrial growth. Automation, atomic energy, fuel cells, electronics, ultrasonics, thermoelectricity, and a host of other developments can lead to spectacular advances.

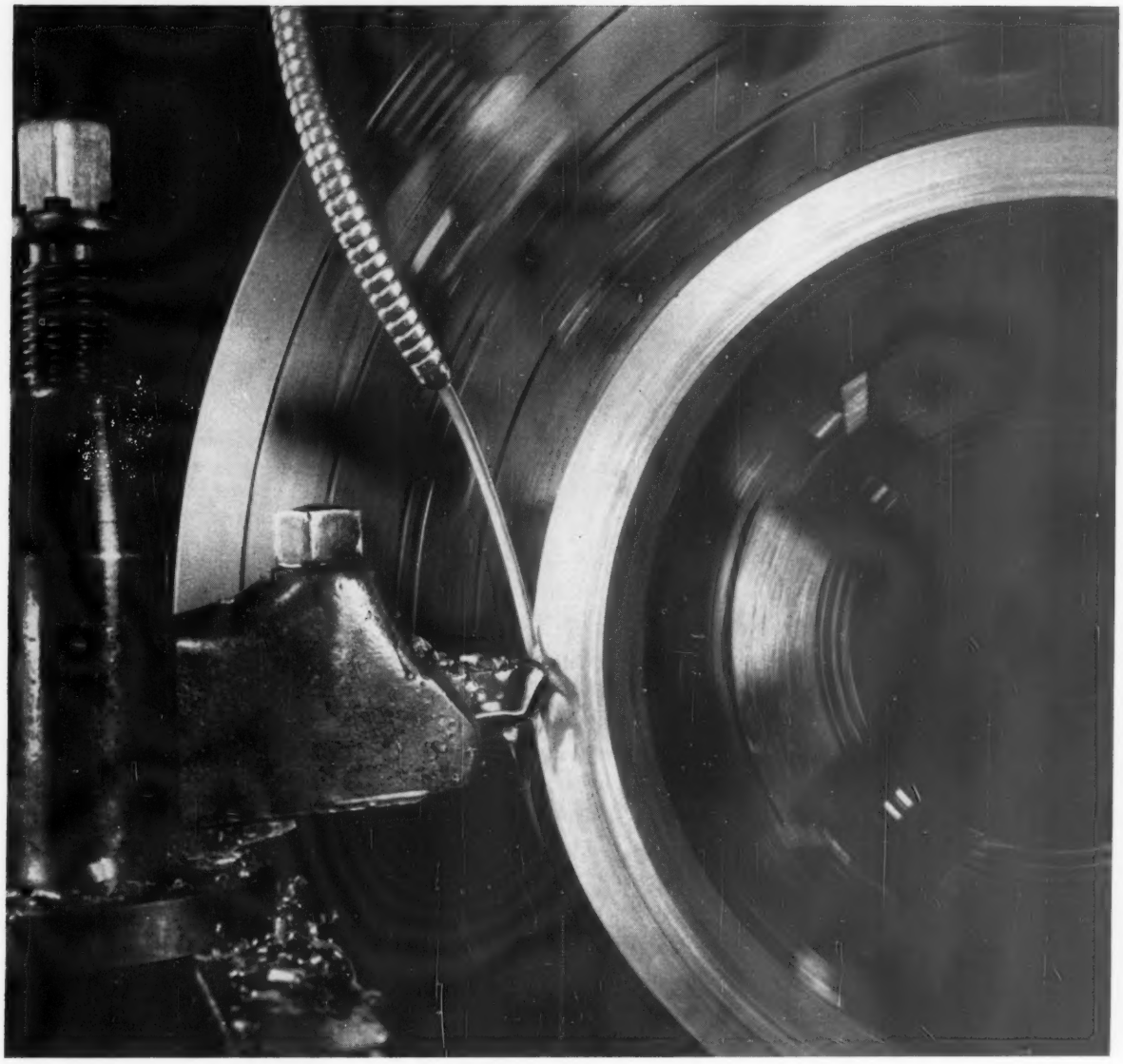
But those opportunities cannot be exploited without investment in their commercial development and implementation. That investment must come from profits.

• **Making Headway**—Every metalworking manager is responsible for the profit level of his company. That level is dependent upon his daily judgment. He must—now—find ways to raise it. In view of today's intense competition which rules out price hikes (whether warranted or not), the chief sound way to raise unit profits is to lower unit costs. That can be done in two interrelated ways: Increase sales volume and improve productivity. The manager must explore approaches to those solutions that have too often been ignored. In the remaining articles in this series, STEEL will examine many of them. Included will be ways to improve market share, overcome competition from other materials and products, increase sales abroad, hike the efficiency of our mounting army of indirect workers, campaign for depreciation reform, adapt technological advances to customer needs, reach untapped markets, improve product design, and keep pace with the information revolution.

Plan for Profit Growth

Our Shrinking Market Share

On Feb. 13, STEEL will point up the severity of metalworking's declining share of the buying dollar, examine the causes, and suggest some remedies. For a free copy of any or all articles in this series, appearing biweekly starting Jan. 16, write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



HOW TO TAKE THE EDGE OFF A HEADACHE

KUTWELL® EP 66 is a new high-quality, water-soluble cutting oil designed to do the tough jobs—cutting special alloys and high-strength tool steels. Its powerful, extreme pressure agents take the toughest cutting, grinding, and drilling jobs in stride. Pieces per tool grind have jumped dramatically when Kutwell EP66 was used instead of higher-cost specialty oils. Machine tool lubrication and rancidity control are effectively maintained.

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NEBULA® EP multi-use grease serves all grease-lubricated parts, even those which require extreme pressure properties. It does an efficient job at high temperatures and resists oxidation for long periods. Your Esso representative is an expert at curing all kinds of lubrication headaches. Contact him, or write us at 15 West 51st St., N. Y. 19, N. Y.

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Slow Sales, High Inventories Signal New Production Cuts

DESIRE TO COMPLETE the 1961 model run before labor contracts expire Aug. 31 is the only thing that's apt to keep car production running at present levels.

January sales, slower than the usual seasonal drop, are just above 1958's recession rate. Dealer inventories still are over the 1 million mark and are expected to stay there through most of the year. Steelmakers say car companies are pushing back delivery dates, but so far have canceled only a few orders.

Ward's Automotive Reports forecasts February production at 430,000 units, about equal to January's. Detroit will have to build more than 500,000 cars in March to meet *Ward's* predicted 1.4 million build-up for the first quarter. Add that to the 2.2 million 1961 cars produced by New Year's Eve and it's easy to figure that the industry only has to knock out another 1.5 million cars in the April-June period to virtually complete the 1961 model run. It can easily clean up another 300,000 in July before shutting down.

• **Dealers Key**—Whether or not automakers can do that apparently rests on their ability to persuade dealers to stock cars at a faster rate. If sales don't pick up in the spring, carmakers will have little success in getting dealers to keep piling up cars in their lots. More than 1000 dealers closed down last year. The remaining 32,000 are already screaming about the high cost of stockpiling more than 1 million cars. At present sales and production rates, inventories could go up to 1.3 million cars.

The companies don't want such a thing to happen either so they're instituting another round of dealer rebates and sales contests. Some divisions are contemplating price cuts. Dodge already has done that by switching some of its standard equipment items to extra cost options. Result is a cut of $17 to $28 in Lancer list prices. If such techniques don't work and if the on again, off again spring sales rush doesn't materialize, the alternative will have to be severe production cutbacks.

Studebaker-Packard Corp. and Chrysler Corp. have already made January-February schedule reductions. Their dealers have 90 day stocks of cars on hand so the two companies have lopped 40,000 units off earlier production plans. Chrysler may cut back more. It's laying off engineers, clerks, and production workers to bring employment down to a level that reportedly is geared for no more than a 700,000 car output in 1961. The company built 1 million autos in calendar 1960.

• **Sales Slow**—It's still too early to tell when sales will pick up. So far Cadillac and Lincoln are selling well. Sales of compacts are slow, dealers report, although Corvair's sporty Monza series seems to be catching fire. A slight increase in used car sales is reported, but stocks of those cars are at the highest level in three years. It's unlikely that dealers can offer substantial enough trade-in allowances to tempt

CORRECTION

STEEL last week inadvertently pictured Frederic G. Donner, chairman, General Motors Corp., in a story involving John F. Gordon, GM's president. We're sorry.

Model Year Output*

(Units)

	1961	1960
COMPACTS		
Falcon	198,000	146,000
Corvair	106,000	112,000
Comet	87,000	.....
Valiant	68,000	37,000
American	64,000	47,000
Lancer	49,000	.....
Lark	39,000	68,000
F-85	46,000	.....
Tempest	43,000	.....
Special	42,000	.....
STANDARDS		
Chevrolet	538,000	401,000
Ford	385,000	449,000
Rambler	116,000	126,000
Dodge	106,000	117,000
Plymouth	104,000	122,000
MEDIUMS		
Pontiac	130,000	129,000
Oldsmobile	128,000	147,000
Buick	101,000	104,000
Mercury	65,000	72,000
Chrysler	40,000	29,000
Thunderbird	26,000	31,000
LUXURY CARS		
Cadillac	61,000	48,000
Lincoln	11,000	15,000
Imperial	9,000	12,000

*Adapted from **Ward's Automotive Reports.** Covers model year through January. Dodge figures include Polara. Rambler includes Ambassador. Mercury Meteors and Chrysler New Yorkers are included in the medium price group.

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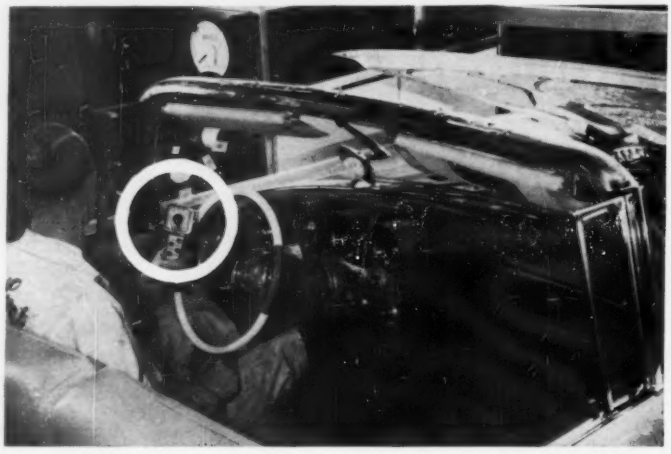

Checking Lincoln's Electrical System

AN ELECTRONIC auditing gage makes it possible to check the entire electrical system on Lincoln Continentals in 15 minutes instead of 2 hours. By using the simple inspection device, Ford can check each car coming down the assembly line. It's one reason why Lincoln feels safe in offering a two year warranty.

Called EAGER (electronic audit gager), the unit was designed and built by Performance Measurements Co., Detroit. It can test up to 339 components in a car and even can predict trouble spots. Typical checks include heater, starter, generator, regulator, windshield wipers, windows, and battery. Even engine speed is measured and recorded.

A film strip within the instrument cabinet projects a test program on a screen so the inspector can see it from the driver's seat. A series of test patterns and acceptable standards is programed onto one-half the tape. The corresponding half contains visual instructions for running the various tests. It also shows what meter readings are needed for acceptable performance. The inspector operates the checker with a remote hand control (circled in picture). The complete test cycle can be run through as fast as the operator can press the control button, perform the required operations requested by the strip film, and scan the results in the visual performance indicator.

Since the unit not only programs the tests, but also conducts them, human error is virtually eliminated. Results are recorded. EAGER can be easily adapted to other types of electrical component testing.

potential buyers of new automobiles.

Sales of imported cars are off, as expected, but Volkswagen continues to hold 40 per cent of this market. December deliveries are estimated at 32,000 units, a two year low.

January figures aren't available, but indications are they may be even lower.

Proxy Fight Rumors Follow Newberg Suit

A PROXY FIGHT may be shaping up at Chrysler Corp., say Detroit tipsters. It will be headed by a businessman from the Detroit area. He'll be backed by an assortment of stockholders who are not connected with Chrysler's management. Sol Dann, vocal dissenting stockholder, will probably try to ally himself with the group, but the story is that he won't be accepted.

STEEL's sources claim that this group hopes the publicity stirred up by ex-President William Newberg's suit against Chrysler will help them solicit enough votes to call for a new management team.

While the action will be several months building, Detroit is awaiting developments in Mr. Newberg's suit. He's trying to get the court to set aside an agreement with the company under which he is to repay $450,000 representing profits he made from stock interests in supplier companies.

Another ousted executive, Jack Minor, former marketing director for the Plymouth-De Soto-Valiant Div., has filed a suit seeking $200,000 for damages to his reputation.

New Layoffs by Automakers

Chrysler Corp. is laying off about 15 per cent or 4500 of its 30,000 salaried personnel. The automaker has been laying off hourly workers since last fall.

Studebaker-Packard Corp. and Ford Motor Co. have also made some cuts in salaried personnel.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
November	597,132	254,527
December	522,239	494,931
Totals	6,694,354	5,593,707

Week Ended	1960	1959
Dec. 24	114,941	103,219
Dec. 31	86,497	112,113
	1961	**1960**
Jan. 7	74,204	163,249
Jan. 14	110,808	173,713
Jan. 21	96,436†	175,060
Jan. 28	102,000*	173,231

†Preliminary. *Estimated by STEEL.
Source: *Ward's Automotive Reports.*

Tension . . . by the ton!

While the air-powered Signode stretcher holds the strapping at its one-ton tension, the workman crimps the seal with a Signode air-powered sealer. The seal, the strap—and the tension—will hold, to keep this 4900-pound bundle of steel bars tight and secure to destination. What material other than steel strapping could do this job, could take and hold this tension, would cost so little, could be applied with air power to do the hard work fast? This hefty bundle is a good example of how—and why—Signode can make your product cost less to handle, store, ship and receive. Write for your free copy of illustrated folder, "Air Power Tensioners and Sealers."

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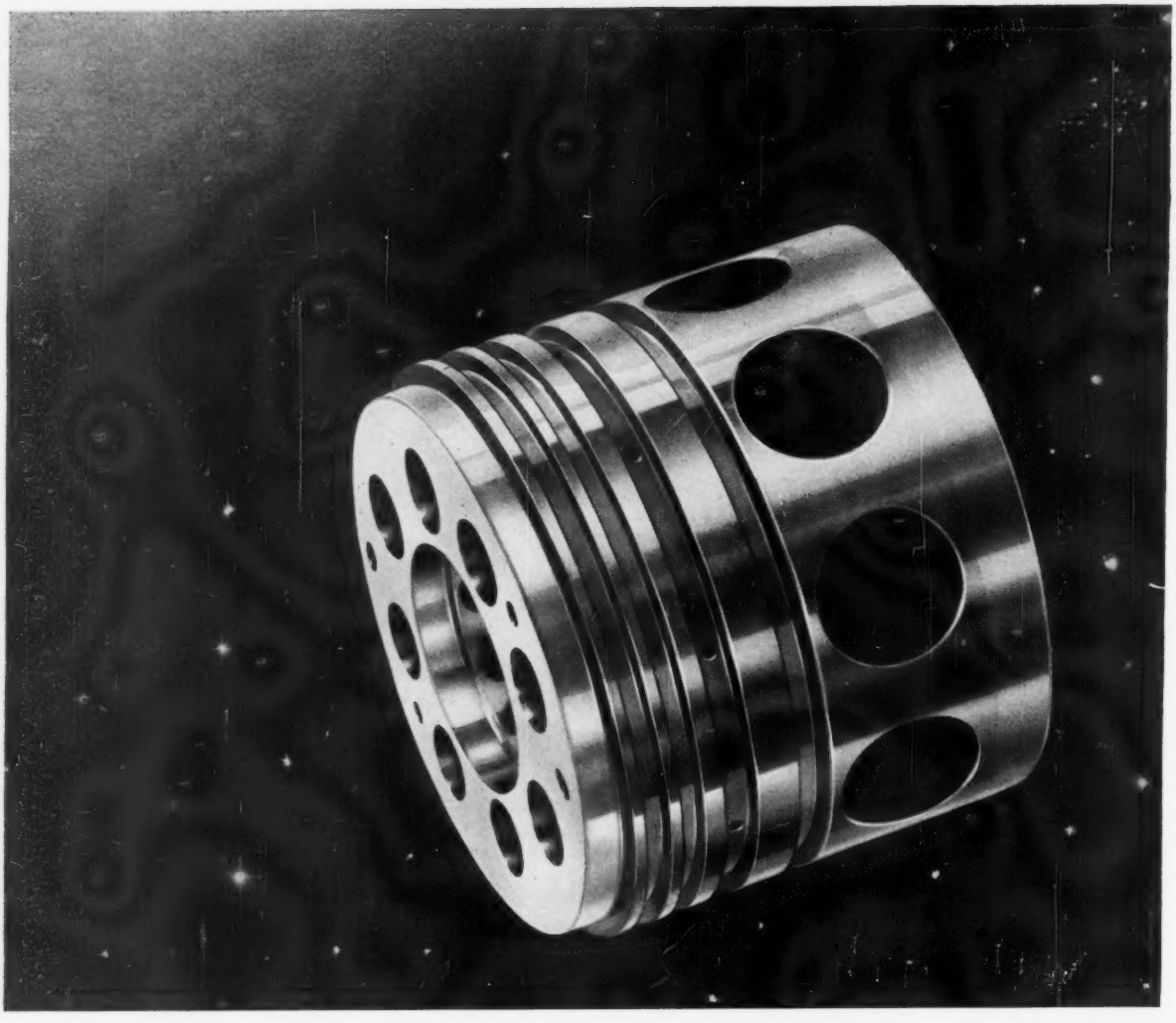

The New York Air Brake Co. reports...

"few rejections, superior quality for hydraulic pump with TIMKEN® steel"

Engineers at Watertown Division of The New York Air Brake Co. needed a Hi-Carbon Alloy Steel for production of this Stratopower 66W Series Hydraulic Pump and because this pump plays a vital role in guided missile and aircraft hydraulic systems, the steel had to be of superior quality and cleanliness.

They consulted Timken Company metallurgists, who've been solving tough steel problems for over 40 years. After careful study, these experts recommended a special aircraft quality Timken® "52100" bar stock. The special characteristics and uniform high quality of every shipment of Timken "52100" provided consistent high quality finished parts.

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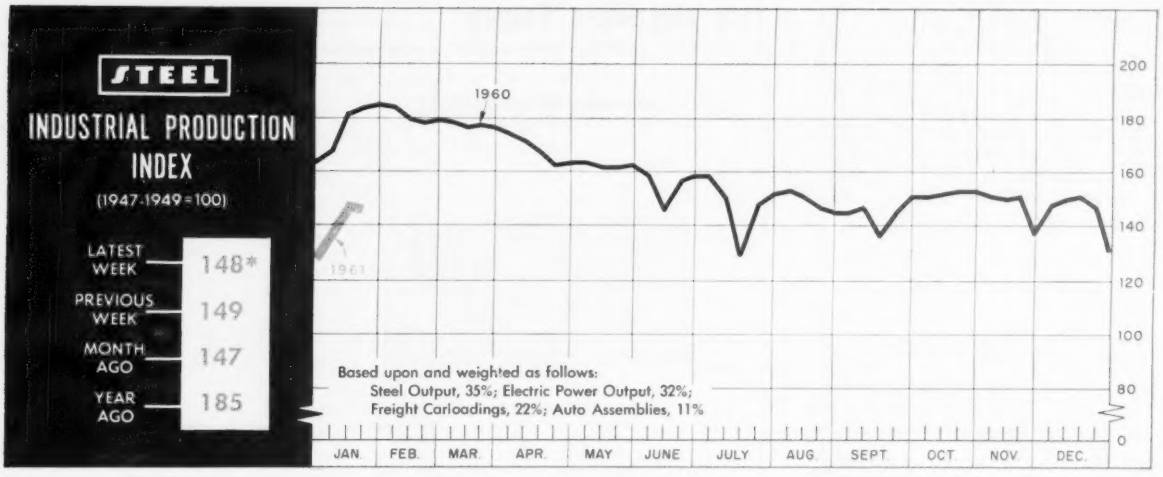

*Week ended Jan. 21.

Snow, Autos, Strikes Plague Index

BAD WEATHER, slackening auto production, and labor problems in the railroad industry combined to hold STEEL's industrial production index (above) on a plain during the latest week. And there is not much chance of an upward change in the final week or so of January. So the stage is set for a further decline of a point or two in the Federal Reserve Board's industrial production index for the month. (See Page 82 for table and graph of FRB index.)

Here's how it happened: Unusually cold weather in January caused many plants, including auto facilities, to work short days or short weeks; and the strike involving about 600 tugboat workers in New York dealt railroad shipping in the East a serious blow by reducing the number of revenue freight carloadings. On the plus side, the weather helped to maintain a high level of electricity consumption for heating, and steelmaking rose slightly. The net result was a decline of 1 point in STEEL's index during the week ended Jan. 21 to a preliminary 148 per cent of the 1947-49 average.

• **Autos Big Problem**—We now have tangible evidence, in the form of cutbacks in production schedules, that automotive officials are concerned about the huge inventory of new cars—more than 1 million units at the turn of the year. More than 40,000 cars have been cut from January and February production plans. New schedules call for 433,600 units in January, 430,300 in February. *Ward's Automotive Reports* says the first quarter goal is about 1.4 million units, leaving a little over 536,000 units scheduled for March. Unless sales come back strongly from the late December-early January slump, the projection for March may be optimistic. (For more on motordom's plans, see Page 77.)

It is difficult to assess the impact of auto production on total indus-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,500[1]	1,499	2,717
Electric Power Distributed (million kw-hr)	15,000[1]	14,684	14,523
Bituminous Coal Output (1000 tons)	7,990[1]	6,960	8,825
Crude Oil Production (daily avg—1000 bbl)	7,175[1]	7,173	7,190
Construction Volume (*ENR*—millions)	$359.8	$623.9	$372.9
Auto, Truck Output—U. S., Canada (*Ward's*)	123,115[1]	139,051	217,683
TRADE			
Freight Carloadings (1000 cars)	475[1]	516	587
Intercity Truck Tonnage (changes from year ago)	−8.2%	+6.2%	+6.9%
Business Failures (Dun & Bradstreet)	335	265	292
Currency in Circulation (millions)[2]	$32,287	$32,637	$31,910
Dept. Store Sales (changes from year ago)[2]	+7%	−11%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$30,704	$30,071	$27,631
Federal Gross Debt (billions)	$290.1	$290.0	$291.8
Bond Volume, NYSE (millions)	$33.3	$35.3	$27.3
Stocks Sales, NYSE (thousands of shares)	20,734	22,227	14,219
Loans & Investments (billions, adjusted)[3]	$109.1	$110.4	$104.0
U. S. Govt. Obligations Held (billions)[3]	$30.2	$30.2	$27.4
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	211.7	214.4	234.2
All Commodities[6]	119.8[1]	119.8	119.3
Commodities Other than Farm & Foods[6]	128.0[1]	128.0	128.7

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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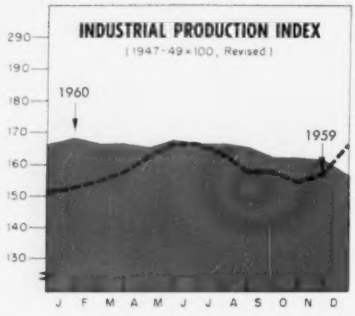
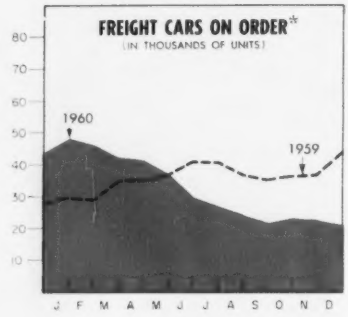
THE BUSINESS TREND





(Seasonally adjusted)

	Total Production 1960	Total Production 1959	Total Mfg. 1960	Total Mfg. 1959	Durables Mfg. 1960	Durables Mfg. 1959
Jan.	168	152	168	150	181	156
Feb.	166	155	166	153	178	160
Mar.	166	157	165	156	175	165
Apr.	165	162	164	161	172	170
May	167	166	166	165	174	177
June	166	166	165	166	171	178
July	166	163	165	163	172	171
Aug.	165	157	163	157	169	159
Sept.	162	157	161	156	166	157
Oct.	161	154	160	153	164	155
Nov.	159	155	157	154	160	156
Dec.	156*	165	154	164	156	174
Avg	...	159	...	158	...	164

Federal Reserve Board. *Preliminary.
Charts copyright, 1961, STEEL.

	Domestic Awards 1960	Domestic Awards 1959	Backlogs (end of month) 1960	Backlogs (end of month) 1959
Jan.	7,149	4,102	48,170	29,470
Feb.	3,411	1,812	46,323	28,789
Mar.	1,959	10,782	42,131	35,487
Apr.	5,551	3,736	41,003	35,479
May	2,234	5,253	36,106	36,869
June	321	8,369	29,555	40,973
July	1,306	4,159	26,658	40,309
Aug.	1,343	1,653	23,866	37,172
Sept.	2,061	943	21,662	35,626
Oct.	5,885	2,722	22,900	36,199
Nov.	3,680	2,424	22,781	36,565
Dec.	2,705	10,560	21,070	43,870
Total	....	56,495		

*Domestic only.
American Railway Car Institute.

trial activity. It accounts for only 11 per cent of STEEL's industrial production index. But it affects the other three segments in varying degrees. Consumption of electricity, about half of which is accounted for by all industry, shows negligible week to week fluctuations because of changes in auto schedules. But in periods of major swings—such as that from October's peak to the present low point—year to year gains in electricity are well below normal. The effects on railroad freight carloadings are less today than they were several years ago because of the marked trend to trucking. But miscellaneous loadings, which currently account for more than half of the total, are certainly held in check when Detroit slashes its schedules.

• **Steelmaking Improves**—Although steelmaking is usually highly sensitive to the ups and downs of the automotive industry, it is resisting the downward influence at the moment.

Steelmaking accounts for the biggest share (35 per cent) of STEEL's industrial production index, so it has helped keep the trend line from dropping off too sharply in the last few weeks. Steel production held at 1.5 million tons last week compared with 1,499,000 the previous week.

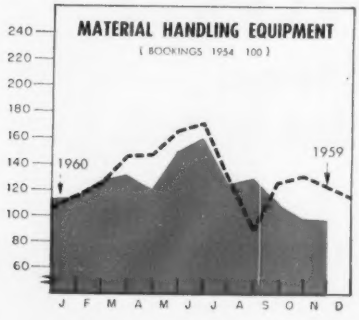
For months, the auto industry was the big prop under the steel industry while other consumers sat back and ate up inventories. Now the situation has reversed itself. Inventory liquidation is gradually coming to a close, and steel users are coming back into the market. While they are doing little more than fill the gap left by automakers, they are preventing the steel industry from going into another tailspin.

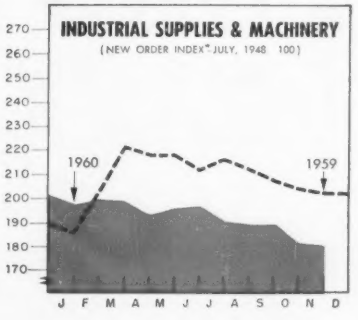
BDSA Remains Optimistic

Many segments of metalworking are improving, according to the latest business forecasts by industry divisions of the Business & Defense Services Administration. Several forecasts indicate that sales and production this year will be equal to or better than last year's.

• **Trucks, Trucktrailers**—A 4.3 per cent gain was marked up by truck builders in 1960 over 1959, and the industry's production will be nearly as good this year, states BDSA.

Trucktrailer output is expected to approximate the 1960 total.





	1960	1959	1958	1957
Jan.	114.96	115.84	93.07	126.34
Feb.	128.74	124.77	93.49	139.29
Mar.	133.60	146.36	97.89	140.76
Apr.	122.41	147.28	122.36	132.67
May	150.33	164.45	118.04	157.95
June	160.23	170.72	131.15	121.57
July	126.79	130.26	134.34	128.31
Aug.	131.33	87.02	104.46	110.09
Sept.	111.11	126.43	85.41	116.79
Oct.	99.89	131.09	111.35	124.80
Nov.	98.96	124.16	110.88	87.80
Dec.	.....	113.78	105.97	105.65
Avg	.....	131.85	109.87	124.34

Material Handling Institute Inc.

	1960	1959	1958	1957
Jan.	198	186	163	221
Feb.	200	202	157	219
Mar.	199	221	149	210
Apr.	194	218	148	203
May	196	218	152	199
June	197	212	164	199
July	191	216	170	197
Aug.	190	212	172	197
Sept.	190	207	178	203
Oct.	182	204	187	192
Nov.	181	202	189	180
Dec.	...	202	190	167

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

• **Mobile Homes**—Output in 1960 was about 145,000 units, the second best total on record. Output this year will be at that level.

• **Machine Tools** — Five factors point to improved shipments and an upturn in orders for machine tools in the second half of 1961, BDSA claims. 1. Production and sales have been at low levels since late in 1957. 2. Obsolescence is becoming an increasingly important problem. 3. The Machine Tool Exposition—1960, with its hundreds of new models, should stimulate new sales. 4. The government is expected to enlarge its modernization and replacement programs in 1961. 5. The reduction of the government's inventory of used tools from 1955 to 1960, plus an anticipated increase in mobilization and weapon system procurement, should result in greater buying by the military service.

• **Antifriction Bearings**—The outlook for this industry is dimmed by the expected decline in automotive requirements, declares BDSA. Even though demand from other users will be strong, the agency sees a slight dip from the near record volume in 1960.

Trends Fore and Aft

• Following up expenditures of $13.8 billion for new equipment and construction since World War II, the steel industry plans to add another $1.2 billion this year, reports the American Iron & Steel Institute. That compares with last year's total of $1.48 billion, the second highest annual total in the industry's history. (The record was $1.7 billion in 1957.)

• Private nonfarm housing starts in December dropped to a seasonally adjusted annual rate of 990,000 units, the lowest level of the year, reports the Commerce Department. Private farm and nonfarm housing starts for all of 1960 totaled 1,240,000 units compared with 1,516,800 in 1959.

• Business failures in 1960 reached a 27 year high, says Dun & Bradstreet Inc. The December figure of 1353 firms moved the annual total to 15,445, 10 per cent ahead of the 1959 total and slightly ahead of the recession year of 1958.

• An upsurge of orders in January postponed the reduction in production and employment originally scheduled for last week at Maytag Co., Newton, Iowa.

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METAL
MEANS
PERFECT
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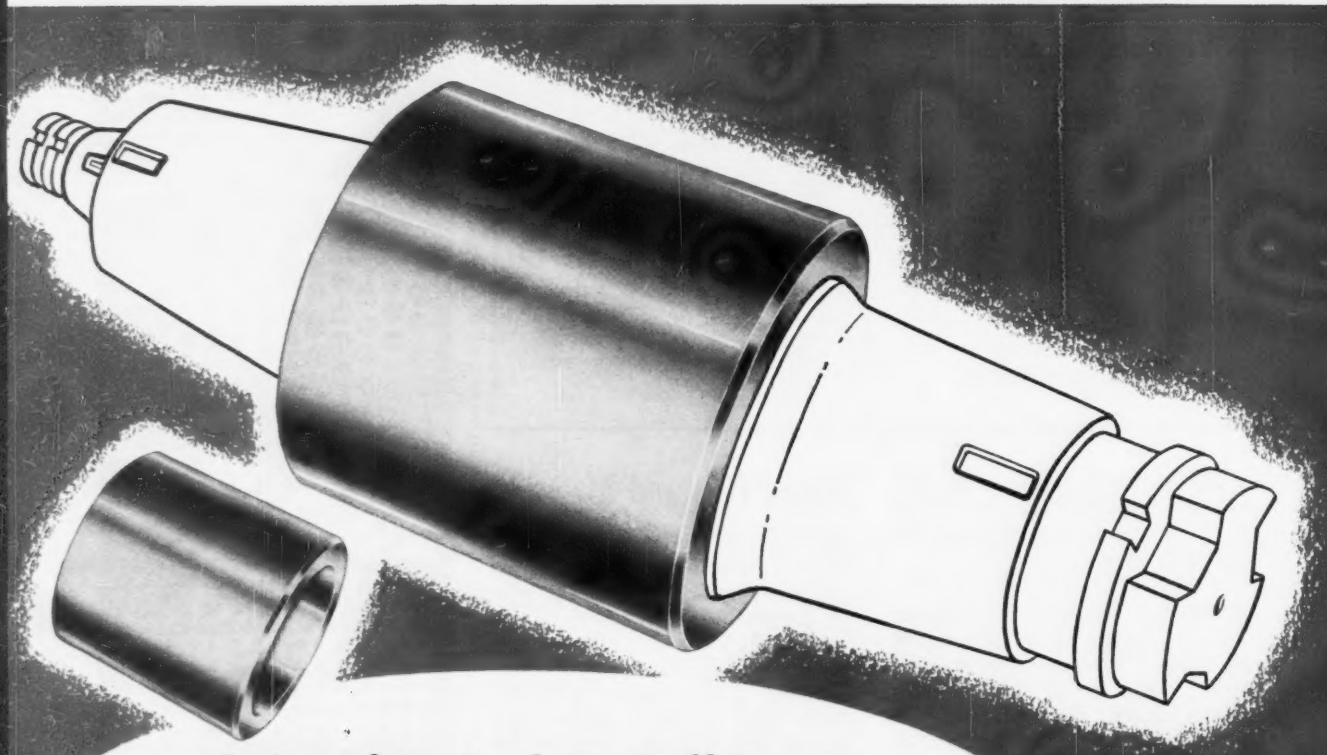
Ohio

FORGED SLEEVES

and Cast Steel or Forged Steel Arbors for Back-Up Rolls



A Complete Back-Up Roll Service

Ohio Steel—specialists in manufacturing all types of iron, steel and forged steel rolls—now offers the rolling mill industry *a superior forged steel sleeve for back-up rolls.*

Ohio back-up roll body sleeves are forged and hardened from *balanced alloy vacuum poured degassed steel.* These sleeves are accurately machined and applied to either new or used forged steel or cast steel arbors.

Yes, Ohio Steel offers a complete back-up roll service. Ask your Ohio roll sales engineer about this modern facility that can help increase rolling mill efficiency.

THE OHIO STEEL FOUNDRY COMPANY
LIMA, OHIO

OHIO IRON and STEEL ROLLS

Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
Nioloy Rolls	Forged Steel Rolls	

PLANTS AT LIMA AND SPRINGFIELD, OHIO. . *Virtually at the center of the Steel Industry*

OR-45

CHARLES W. COLEMAN
National Pneumatic exec. v. p.

MICHAEL J. FINK
Mechanical Specialties v. p.

HERBERT J. COOPER
Cooper Alloy president

ROBERT W. CORNELL
Parker-Hannifin exec. v. p.

Charles W. Coleman was appointed executive vice president, **National Pneumatic Co. Inc.**, Boston, a new post created following acquisition of Janette Electric Mfg. Co. Mr. Coleman was controller for the company, and previously was general manager, Gabriel Electronics Div., Gabriel Co.

Michael J. Fink was named vice president - general manager, **Mechanical Specialties Co.**, Los Angeles. He joined the firm as chief engineer in 1959, and was elected vice president-engineering last June.

John J. Helvaty was made purchasing agent of **Mallory Metallurgical Co.**, Indianapolis, division of P. R. Mallory & Co. Inc. He succeeds **W. J. Topmiller**, recently made corporate director of purchasing.

Steve Stasko was made chief metallurgist, **Mackintosh-Hemphill Div.**, Pittsburgh, E. W. Bliss Co. He succeeds **Edward P. Sandbach**, recently promoted to manager of manufacturing.

Waldo V. Tiscornia was elected president and general manager, **Auto Specialties Mfg. Co.**, St. Joseph, Mich., to succeed his brother, the late **James W. Tiscornia. R. M. Foote** was named president and general manager of the Canadian affiliate, Auto Specialties Mfg. Co. (Canada) Ltd., to succeed the late **W. H. Cantelon.**

Paul W. Coffman was made general superintendent of **Acme Steel Co.'s** Riverdale, Ill., plant. He was assistant general superintendent.

Herbert J. Cooper was elected president and chief executive officer of **Cooper Alloy Corp.**, Hillside, N. J., and its subsidiary, Vanton Pump & Equipment Corp. Div. He succeeds **Harry A. Cooper**, founder of the corporation, who becomes chairman. The new president had previously served as executive vice president.

Harry B. Cummings was elected president, **Nicholas Kay** senior vice president of **Thomas Flexible Coupling Co.**, Warren, Pa., subsidiary of Koppers Co. Inc.

Howard W. Bennett was named market manager of **Morse Chain Co.**, Ithaca, N. Y. He was with General Electric Co.

Graver Tank & Mfg. Co., East Chicago, Ind., division of Union Tank Car Co., appointed **Henry H. Hemenway** vice president-research and engineering; **Willard M. Broxham** (vice president) as Pacific Coast sales manager; **Lionel G. Lancaster** vice president-construction.

Robert W. Cornell, former vice president-industrial marketing, was elected to the new post of executive vice president of **Parker-Hannifin Corp.**, Cleveland. He has general responsibility for all industrial and mobile equipment, including Parker Fittings & Hose Div. and Parker Hydraulics Div., Cleveland; and Hannifin Co. Div., Des Plaines, Ill.

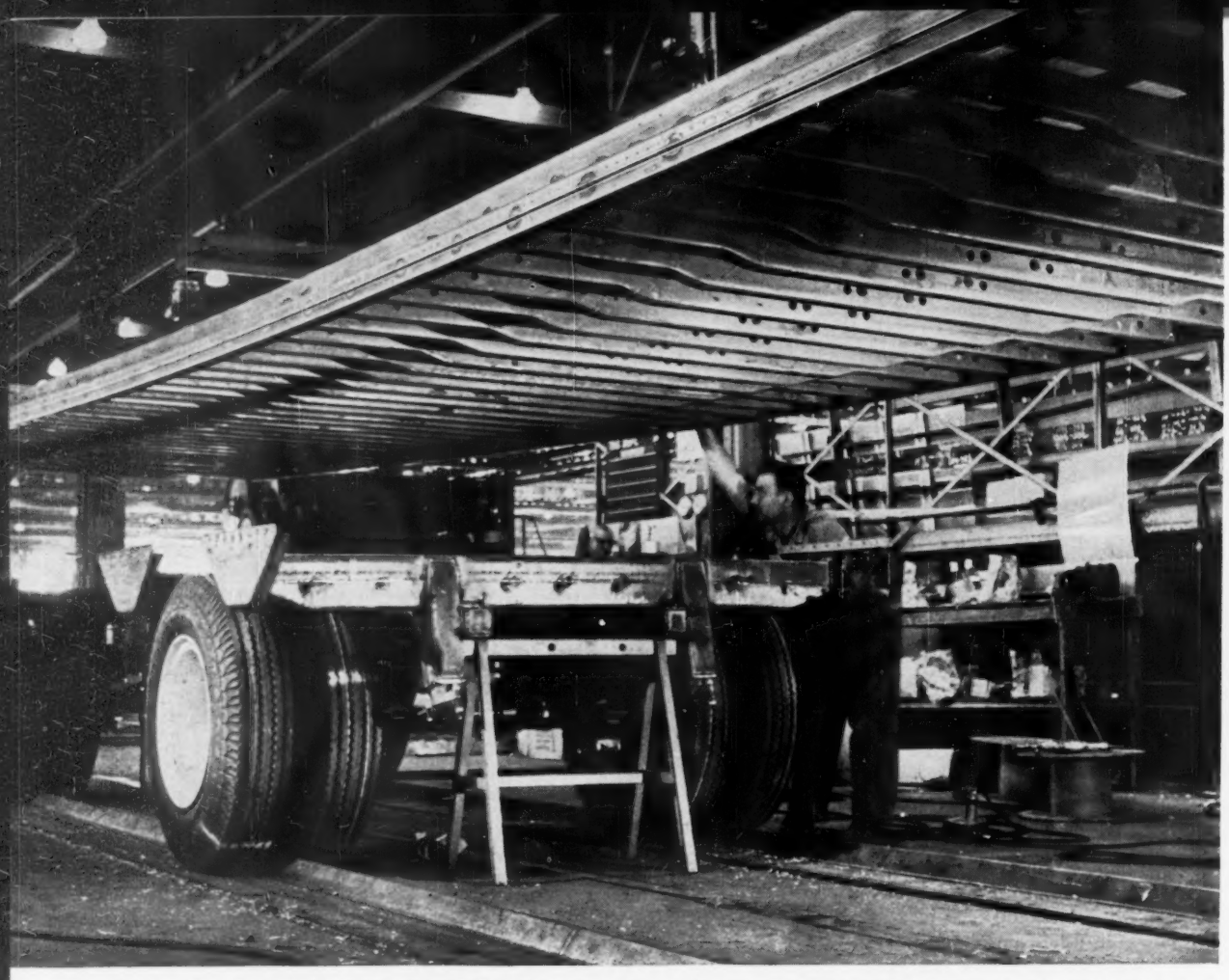
Fred D. Crowther was elected president of **Henry Pratt Co.**, Chicago. He was vice president and general manager of Chapman Valve Mfg. Co.

George M. Lamb was named sales manager for **Moore Special Tool Co.**, Bridgeport, Conn.

At the Williamsport, Pa., operation of Avco Corp.'s **Lycoming Div.**, **John M. Ferris** was made vice president-sales; **C. H. Buddenbaum** vice president - manufacturing; **C. H. Wiegman** vice president-engineering. In addition, **Floyd J. Bird**, vice president and plant manager of the

(*Please turn to Page* 88)

HENRY H. HEMENWAY — WILLARD M. BROXHAM — LIONEL G. LANCASTER
Graver Tank & Mfg. vice presidents



At Fruehauf Trailers' huge Avon Lake, Ohio, plant, crossmembers made from PITT-TEN high strength structural sheet provide 22 percent more payload.

Here, on the assembly line, a Fruehauf trailer bed made with Pittsburgh Steel Co. PITT-TEN is swung onto the underconstruction assembly.

As Trailer Bed Crossmembers

Fruehauf Gets 22% More Payload With Pittsburgh Steel's New PITT-TEN

Twenty-two percent more payload—that's what Fruehauf is building into the framework of giant trailers assembled with crossmembers made of PITT-TEN, Pittsburgh Steel Company's new high strength structural sheet.

Fruehauf uses PITT-TEN #1 at its Avon Lake, Ohio, plant—the largest trailer manufacturing facility in the world—because it offers a combination of benefits that . . .

- **Cuts deadweight with no loss of strength**
- **Lengthens service life through superior corrosion resistance**

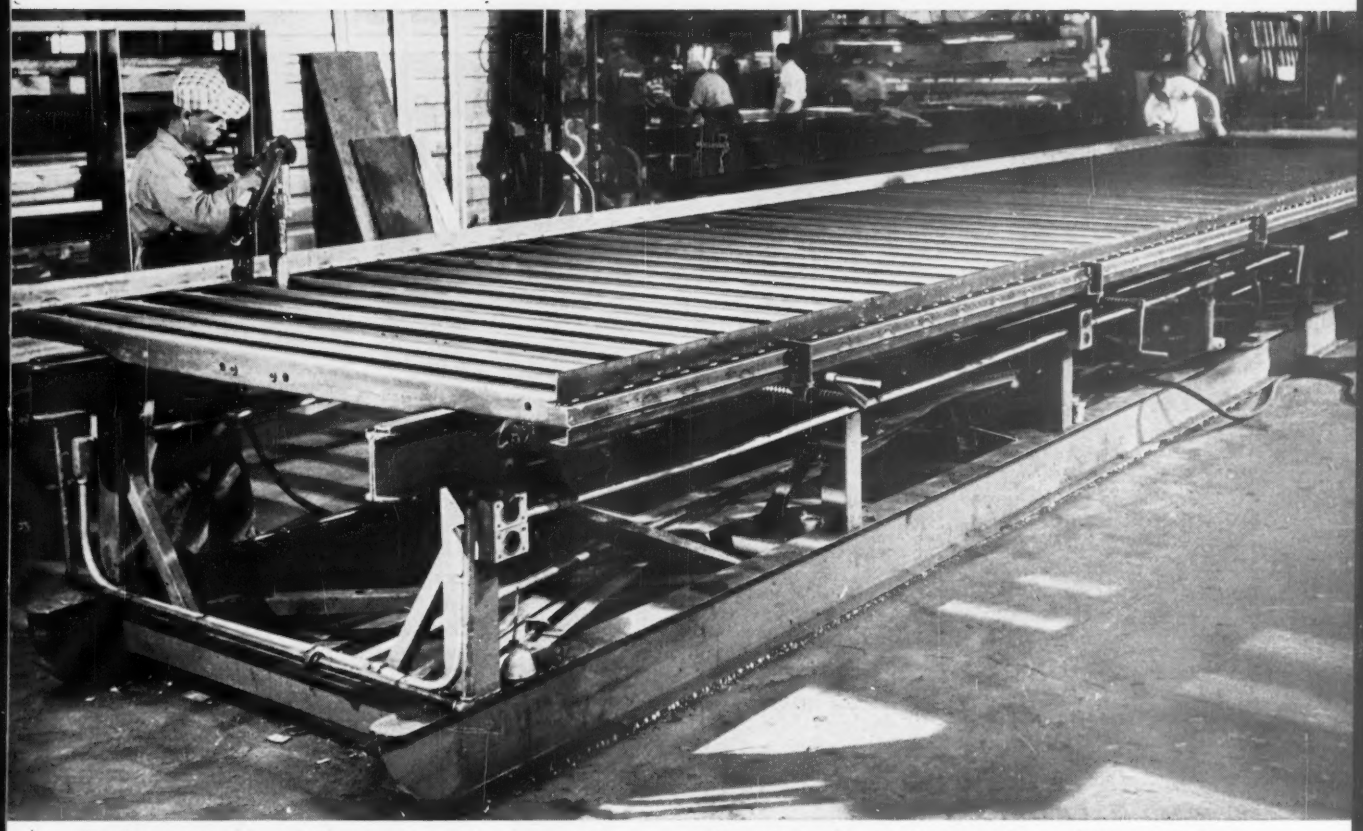
• **Light Yet Strong** — Fruehauf tries to make its trailers as light as possible with no sacrifice in strength. Trailer bed crossmembers made of high strength PITT-TEN are lighter, for equal strength, than mild steel.

The weight saving amounts to more than eight pounds for each piece. That's because three pounds of PITT-TEN do the work of nearly four pounds of ordinary sheet steel. At the same time, it provides all the strength needed for years of hard use.

Corrosion resistance is another problem in trailer operation. Fruehauf trailers are used under all types of conditions that could create maintenance headaches if the proper material were not used.

PITT-TEN #1 has four to six times the resistance of carbon steel to atmospheric corrosion. So, Fruehauf specifies PITT-TEN to reduce maintenance costs.

The trailer part basically is a channel 93⅞ inches long, 2 inches deep and 3 inches wide. Its width is expanded to 4½ inches on one side by an offset that extends most of its length. In addition, a ¾-inch



During assembly of Fruehauf trailer bed, cross-members made from high strength structural PITT-TEN are riveted to the side rail. PITT-TEN #1 reduces maintenance requirements of Fruehauf trailers through superior corrosion resistance. It has four to six times the corrosion resistance of carbon steel to atmospheric corrosion. PITT-TEN also cuts deadweight with no loss in strength.

return flange is applied full length to both edges.

Fruehauf engineers point out that forming this piece with offset and flange in high tensile steel would be a tricky business without consistent quality — and with PITT-TEN Fruehauf has a steel that does the job.

PITTSBURGH STEEL NEW SOURCE – This is one of several applications which mark the entry of Pittsburgh Steel in the high strength steel market, one of the fastest growing in metalworking.

That means this:

Fabricators of high strength steel structurals—or any product where the weight/strength ratio is a factor—now have a new source of supply.

In the eight years Pittsburgh Steel has been producing flat-rolled products, it has become recognized for the unexcelled quality of its steel sheet and strip. Now PITT-TEN is being produced by the same fine steelmaking and steel rolling facilities which have earned that reputation for quality.

PITT-TEN is produced in three grades, each with specific physical properties. Briefly, here they are:

PITT-TEN #1—An all-around high strength structural sheet that offers a combination of benefits. First is greater strength without increased weight; or equal strength with a lighter section. Second is longer product life, less maintenance through greater resistance to corrosion (four to six times that of mild carbon steel.)

PITT-TEN #2—high strength sheet with exceptional formability. This grade is produced to tensile and yield requirements to meet forming problems of specific fabricated parts.

PITT-TEN "X"—produced to guaranteed minimum yield points of 45,000 and 50,000 psi. This grade is especially useful where the controlling factor is a reduction in weight without loss of strength.

If your product's success depends on weight/strength factors, then Pittsburgh Steel's new PITT-TEN can benefit you, too.

Let one of our service metallurgists show you how. They're as familiar with steel fabricating problems as they are with steelmaking problems. Just contact one of the sales offices listed here.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

Steel

M. G. SEDAM

G. M. HOHMANN

Alloy Rods president, exec. v. p.

ROBERT F. STEWART

DAVID FALES III

Gabriel Electronics appointments

(*Continued from Page* 85)
Williamsport plant, was named vice president-general manager.

M. G. Sedam was elected president of **Alloy Rods Co.**, York, Pa. **Edward J. Brady**, president and founder, becomes chairman and continues as chief executive officer. **G. M. Hohmann**, former vice president-production, succeeds Mr. Sedam as executive vice president.

Anthony E. Schnopp was appointed purchasing agent of **Whitehead Metals Inc.**, New York.

Hugh L. Whitehouse was named a vice president and secretary of **Rotor Tool Co.**, Cleveland. **Leonard W. Dwors** was named treasurer. Mr. Whitehouse continues as director of engineering.

Herman L. Dulberg was made chief mechanical engineer of **Radiation Dynamics Inc.**, Westbury, N. Y.

Dr. C. H. Toensing was made director, powder metals research, **Firth Sterling Inc.**, Pittsburgh. He succeeds **J. C. Redmond**, resigned. Prior to joining Firth Sterling 18 months ago as manager-powder metals research, Dr. Toensing was with General Electric Co. **Melvin A. Jones** was made superintendent-fabrication, following resignation of **E. W. Coleman. Blaine R. Helmer** succeeds Mr. Jones as chief industrial engineer.

Robert D. Teece was named vice president - engineering, **Harnischfeger Corp.**, Milwaukee, to succeed **William S. Burdick**, now corporate consulting engineer. **Bernard Pratte**, former general manager, Pacific Div., Los Angeles, was elected assistant to the president.

Robert F. Stewart was appointed vice president-marketing and **David Fales III** chief engineer of **Gabriel Electronics Div.**, Millis, Mass., Gabriel Co. Mr. Stewart was staff assistant to the division president. Mr. Fales was manager of electronic product sales and staff engineer for Martin Co., Baltimore.

Harvey A. Craig was named assistant to the vice president-sales, corporate trade relations, for **Republic Steel Corp.**, Cleveland, a new post.

Donald E. Brodeur was made assistant manager, **Motor State Products Div.**, Detroit, Dura Corp.

R. M. Crum was made manager of the Ohio region (Cleveland-Cincinnati territories) of **Fafnir Bearing Co.** He succeeds **R. F. Steeneck**, retiring after seven years in charge of the Cleveland office. Succeeding Mr. Crum as Cincinnati district manager is **W. H. Schauer.** He is assisted by **Richard Rival. E. C. Gauron** was named regional manager of the newly created Pittsburgh region.

R. H. Merriman was made district manager of **Air Reduction Sales Co.'s** Philadelphia office. He succeeds **N. F. Moody**, now Eastern regional sales manager.

Donald Nofziger was made regional sales manager for **Pacific Fasteners Corp.**, Los Angeles.

Edwin A. Raymond was made executive vice president, **Tube Distributors, California Inc.**, Pasadena.

Melpar Inc., Falls Church, Va., subsidiary of Westinghouse Air Brake Co., elected **Edward M. Bostick** president and chief executive officer to succeed **Thomas Meloy**, now chairman. **Arthur C. Weid** was elected executive vice president.

William L. Schubert was made works manager of Philco Corp.'s **Rex Mfg. Div.** at Connersville, Ind. He succeeds **R. Dane Steele**, retired.

Hawkridge Bros. Co., Boston, appointed **Warren E. Nelson** manager of aluminum sales; **Arthur Fox** product manager in the Waterbury, Conn., office; and **John Rowley** product manager in the Boston office.

Harry A. Wilson Jr. was made assistant to the vice president-marketing for **Howe Sound Co.**, New York.

Robert E. Ingison was made technical director, Dilts Div., **Black-Clawson Co.**, Fulton, N. Y.

Hugh D. Connell was made sales manager, **Acme Steel Products Div.**, Chicago, Acme Steel Co.

Seth S. Kidman was made superintendent of the Baton Rouge, La., plant of **Cal-Metal Pipe Corp.**

James M. Connell was made manager-Eastern region for **Pyle-National Co.** He was district manager at Philadelphia.

Richard A. Sweet was made general manager of distribution, a new post at **Aluminum Co. of America**, Pittsburgh. He was manager-sheet and plate sales.

J. W. Slattery fills the new post of manager - distributor relations at

Crucible Steel Co. of America, Pittsburgh.

Vernal C. German was made general manager of **Cochrane Corp.**, Philadelphia, recently acquired division of Crane Co. He was sales vice president of the Cochrane Div. in Toronto, Ont.

Alex M. McMillan was named manager of production, **Wheeling Steel Corp.**, Wheeling, W. Va. He was assistant manager-production.

Albert S. Burgoyne was appointed vice president and general manager, **Chicago-Latrobe Div.**, Chicago, United-Greenfield Corp. He was a vice president at E. W. Bliss Co.

George A. Dauphinais was elected vice president and assistant to the president, **Electric Autolite Co.**, Toledo, Ohio. He is primarily concerned with facilities planning. He was vice president of Yuba Consolidated Industries Inc., and previously was with Quaker Rubber Div., H. K. Porter Company Inc.

Russell P. Hook was appointed chief engineer of **Norton Co.'s** Machine Tool Div., Worcester, Mass. He succeeds **Herbert A. Silven**, retired. **Stewart S. Mader** succeeds Mr. Hook as machine development engineer.

Harry L. Hildebrand was named to the new post of general manager of **Dytronics Inc.**, Rochester, Mich., subsidiary of Taylor Fibre Co. He was manager of process and design engineering for Taylor Fibre's plants at Norristown, Pa., and at LaVerne, Calif.

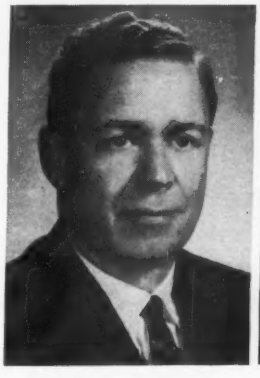
B. E. Olsen was made assistant manager-sheet and strip sales, **Kaiser Steel Corp.**, Oakland, Calif. He succeeds **W. S. Barnum**, recently named assistant manager of tubular sales with Oakland general sales.

Ben T. Beasley was appointed superintendent, Electrical Dept. of **Republic Steel Corp.'s** Cleveland district steel plant. Former assistant superintendent, he succeeds **I. N. Tull**, who will devote his entire time to duties as chairman of the corporation's Electrical Committee. **Elton G. Hoehn** was named assistant to the vice president-sales administrative in Republic's general sales offices.

VERNAL C. GERMAN
gen. mgr. of Crane Div.

ALEX M. McMILLAN
Wheeling Steel production mgr.

ALBERT S. BURGOYNE
Chicago-Latrobe v. p.



GEORGE A. DAUPHINAIS
joins Electric Autolite

RUSSELL P. HOOK
Norton machine tool eng.

HARRY L. HILDEBRAND
Dytronics gen. mgr.

ROBERT D. CALVERT
Electro-Mechanical gen. mgr.

EUGENE J. ANDRYSIAK
McCray Refrigerator v. p.

FRANK HIGHAM
Viking Copper Tube v. p.

Robert D. Calvert was appointed general manager, **Electro-Mechanical Div.**, Grand Rapids, Mich., Lear Inc.

Charles E. Lamar and **Gordon C. Graham** were named vice presidents, Southern Pipe Div., **U. S. Industries Inc.**, Azusa, Calif. Mr. Lamar is in charge of marketing, Mr. Graham of manufacturing.

Eugene J. Andrysiak was made vice president - manufacturing, **McCray Refrigerator Co. Inc.**, Kendallville, Ind. He was works manager. **Hugh E. Cooper**, general sales manager, was made vice president-sales.

Frank Higham was made vice president of **Viking Copper Tube Co.**, Cleveland. He has been director of manufacturing since 1957.

HIGH GRADE • INTERMEDIATE • BRASS SPECIAL

Now!

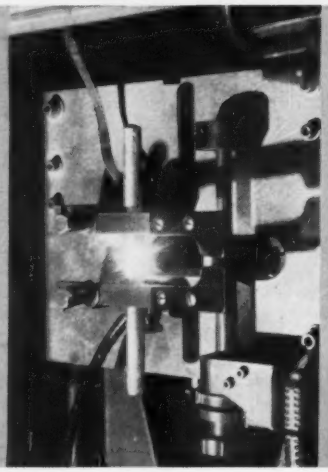
ST. JOE

▶ New Member Of The Famous Line of St. Joe Metals

▶ Developed By ***Research***—

Guarded By Stringent ***Quality Control***

Sample To Complete Analysis in 10 Minutes



To maintain St. Joe zinc's unmatched purity on a continuous basis, an operator casts samples (shown 1/5 actual size) and sends them via air tube to the Baird-Atomic Direct Reading Spectrometer. There a technician places the samples in the Spectrometer's electrode holders. Extremely high voltage creates an arc across the electrodes. As elements are vaporized, light from the arc is broken into element lines of varying light energy.

. . . And This Is How It's Done

This energy, directed to photomultipliers (photo-sensitive electronic tubes), is converted to electrical energy which actuates pre-calibrated dials that indicate elements directly IN PERCENTAGES! In five minutes the zinc sample can be completely analyzed for iron, lead, cadmium, copper, aluminum, indium, tin, antimony, silicon and magnesium. Two minutes later by return tube casting room operators know whether or not they are holding critical purity specifications.

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ZINC

99.99+%

St. Joe's modern research laboratories developed the process — St. Joe's rigid, scientific quality control maintains consistent guard over the product — St. Joe 99.99+% Zinc.

Every shipment of St. Joe 99.99+% Zinc is backed by St. Joe's reputation of nearly a century as a supplier of quality metal to American Industry. Consistent metal from St. Joe means consistent results in die-casting.

ST. JOSEPH LEAD COMPANY

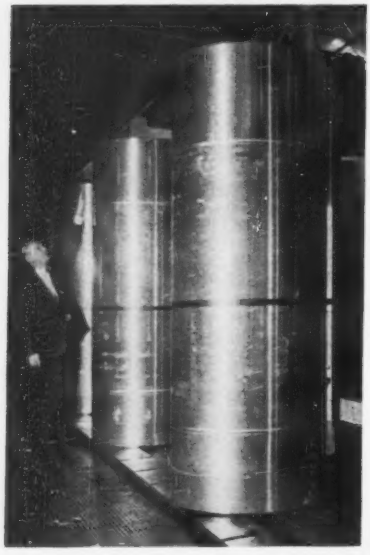
ST. JOE

250 PARK AVENUE NEW YORK 17, N. Y.

Reynolds Aluminum Offers Wider Sheet and Plate

EXTREMELY WIDE coiled aluminum sheet and plate are being mass produced on a new "hot line" at Reynolds Metals Co.'s alloy plant at Sheffield, Ala. The line is capable of producing coils almost 7 ft in diameter that weigh 30,000 lb.

The line includes a 170 in. wide reversing mill, a 130 in. wide reversing mill, and a four stand, 120 in. continuous strip mill. The 170 in. mill can produce plate up to 165 in. wide; the 120 in. strip mill, coils up to 115 in. wide before trimming.



The mills were built by United Engineering Co., Pittsburgh.

The hot line is designed to handle a big ingot every 2 minutes. Aluminum sheet comes out of the last stand or set of rolls on the four stand mill at more than 1000 fpm (at full speed). The line is about three city blocks long. The 170 in. mill is higher than a three story building.

The plant also has a 112 in. cold mill for further rolling of wide coils off the hot line.

In the accompanying photo, the 115 in. coils are moving down the conveyor line. (Also shown, D. H. Hipp, plant manager.)

G. L. Simms, general manufacturing manager for sheet products, says the new hot line and related equipment are major parts of a three year expansion program now nearing completion at the alloy plant. Giant soaking pits, three big batteries of reheating and annealing furnaces, a large scalper, and a variety of new sheet finishing equipment are part of the program.

Operates Pattern Mill

Aluminum Co. of America, Pittsburgh, has placed in operation at its Alcoa (Tenn.) Works a 300 ton pattern mill capable of producing patterned sheets up to 62 in. wide. The mill can produce patterns by coining or embossing. After the rolling process, any appropriate aluminum finishing method (mechanical, chemical, electrochemical, painting, or porcelainizing) may be applied.

Dow Leases Foundry

Wellman Bronze & Aluminum Co., Cleveland, will lease a sand and permanent mold foundry in Bay City, Mich., from Dow Chemical Co., Midland, Mich. The foundry produces magnesium and aluminum castings. Dow is removing itself from competition with foundries that are its customers for magnesium ingots. Dr. F. J. Dunkerley will be vice president of manufacturing at the Bay City foundry.

Enlarging Taconite Units

Reserve Mining Co. is expanding its taconite processing facilities at Silver Bay, Minn., by about 50 per cent. Major elements of the $120 million project are: Increasing iron ore pellet producing capacity by about 3.5 million tons—to more than 9 million tons a year; construction of a second coarse crushing plant near the company's mine at Babbitt, Minn.; building a second rail line along the 47 mile railroad used to transport rock mined at Babbitt to the processing plant at Silver Bay; installation of a second car dumper at Silver Bay; expansion of the fine crushing, concentrating, and pelletizing plants on the shore of Lake Superior; and doubling the maintenance and repair buildings at both locations, as well as enlarging the power production facilities, the boat loading equipment, and pellet stockpile area.

Inco Opens Welding Lab

International Nickel Co. Inc., New York, has placed in operation a $200,000 welding laboratory at its Huntington (W. Va.) Alloy Products Div. Specialized equipment is being installed in the 4000 sq ft facility. A major part of the research will be on nuclear power.

Blast Furnace Work Starts

Pilings that will anchor the foundations for U. S. Steel Corp.'s No. 6 blast furnace at its Duquesne (Pa.) Works are being driven by Ragnar - Benson Inc., foundation contractor. The new furnace will have a hearth diameter of 28 ft and will have a rated capacity of 850,000 tons of iron a year. It will be equipped with advanced features that will make it a valuable research tool in the study of blast furnace operating problems, says J. W. Price Jr., general superintendent, Duquesne Works. Completion of the project is expected to take two years.

Westinghouse Builds

Westinghouse Electric Corp., Pittsburgh, has completed construction of a 50,000 sq ft building at Youngwood, Pa. It will be devoted primarily to the development and processing of semiconductor materials, including new forms of silicon and germanium. Certain areas of the new laboratory are used for pilot production; others, for sensitive chemical operations. A portion of the manufacturing engineering laboratory has been moved into the new building.

The corporation has started construction on its new Astroelectronics Laboratory in the Conejo Valley, 40 miles Northwest of Los Angeles. The new facilities will be devoted to defense projects with special emphasis on the development of advanced electronic tech-

niques for application in the missile and space fields.

Westinghouse plans to begin work on a $1,150,000 warehouse and storage system at its Sharon, Ohio, transformer plant Apr. 1. It's part of a $5 million modernization program.

Lets Coke Oven Contract

Donner-Hanna Coke Corp., Buffalo, has launched a multimillion dollar replacement and modernization program. The project will include construction of a battery of 50 coke ovens, replacing 20 per cent of the plant's cokemaking capacity. Additional gas processing and pumping equipment will also be added. Construction is scheduled to start about Mar. 1 with completion expected about ten months later. The contract for the coke oven replacement has been awarded to Koppers Co., Pittsburgh.

Republic Expands in South

Further expansion of Republic's Gadsden (Ala.) steel plant is planned. Equipment will be added in the strip mill. Construction has started on a fourth stand for the three stand, tandem cold reduction mill. Twelve annealing furnaces will be added, and a breaker line will be installed between the hot strip mill and the cold reduction mill. It will be equipped with a side trimmer, a roller leveler, and a tight coiler.

The company has announced completion of two new blocks of soaking pits at the blooming mill. Other facilities added during 1960 included a sinter plant and wire annealing equipment. Construction on a 65 oven coke battery is in progress—it'll be ready by mid-1961.

Annealing Line Installed

Sharon Steel Corp., Sharon, Pa., has completed a new unit for the production of bright annealed, stainless steel which will eliminate costly buffing and pickling operations. The new line is going into operation this month at the Roemer Works, Farrell, Pa. Cost: $1 million. The firm will produce bright annealed, stainless strip from 0.010 to 0.100 in. thick in widths up to 23-15/16 in.

NEW PLANTS

General Electric Co., Schenectady, N. Y., is building a plant in Cleveland that will produce new sizes and shapes of tungsten, molybdenum, and other refractory metals. The firm expects to invest $15 million in the facility by 1965, the firm's largest single investment ever made in the area. The first phase of construction is expected to be completed this year. It'll cost about $7 million.

Illinois Tool Works, Chicago, has completed construction of a plant at 1901 S. Mt. Prospect Rd., Des Plaines, Ill., for its Conex Div. The facility is expected to be in full production by Feb. 1. The division makes plastic containers and packaging products.

Federal - Mogul - Bower Bearings Inc., Detroit, is building a plant for its Arrowhead Products Div. (aircraft, missile components) at Los Alamitos, Calif.

Simonds Saw & Steel Co., Fitchburg, Mass., opened a branch warehouse, sales office, and service shop at 1160 Springfield Rd., Union, N. J. The facility replaces the Boston branch and will serve as headquarters for the East Coast branch of its subsidiary, Heller Tool Co.

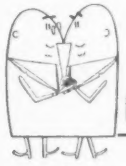
Refractory & Insulation Corp., New York, opened new warehouses and sales offices in Pittsburgh, Detroit, and Birmingham. Additional offices and warehouses are planned for Charleston, W. Va., and Boston.

Westinghouse Electric Corp., Pittsburgh, is constructing a product distribution center at 3501 Highway 100, Minneapolis, Minn. It is the location of a Westinghouse Lamp Div. warehouse and office building which will be doubled in size to provide 73,000 sq ft of floor space.

Universal Electric Co., Owosso, Mich., is erecting a branch manufacturing plant at Ripley, Tenn. Cost: $750,000. The firm makes electric motors.

National Automatic Tool Co. Inc., Richmond, Ind., purchased the Bucyrus-Erie Co. plant in that city. The new facility contains 365,000 sq ft of floor space, almost 50 per cent more than Natco's present Richmond plant. The firm's products include multiple spindle boring, drilling, and tapping machines; large transfer machines; injection molding machines for plastics; brake presses; and honing machinery.

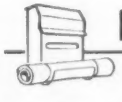
Heisler Corp., Wilmington, Del., is opening a second plant in that city. New compounding equipment is being installed in the plant which includes 60,000 sq ft of warehouse space.



CONSOLIDATIONS

Frederic B. Stevens Inc., Detroit, acquired **Clark-Cooper Inc.**, Palmyra, N. J., manufacturer of flow metering pumps and related equipment. Clark-Cooper's manufacturing facilities have been moved to a plant in Springfield, Ohio. R. A. Taylor has been elected vice president of Stevens, a subsidiary of Udylite Corp., Detroit, and will direct the operation of the Clark-Cooper Div.

American Machine & Foundry Co., New York, is acquiring **Paragon Electric Co.**, Two Rivers, Wis., manufacturer of electrical timers and controls. G. J. Platt will continue as Paragon president.

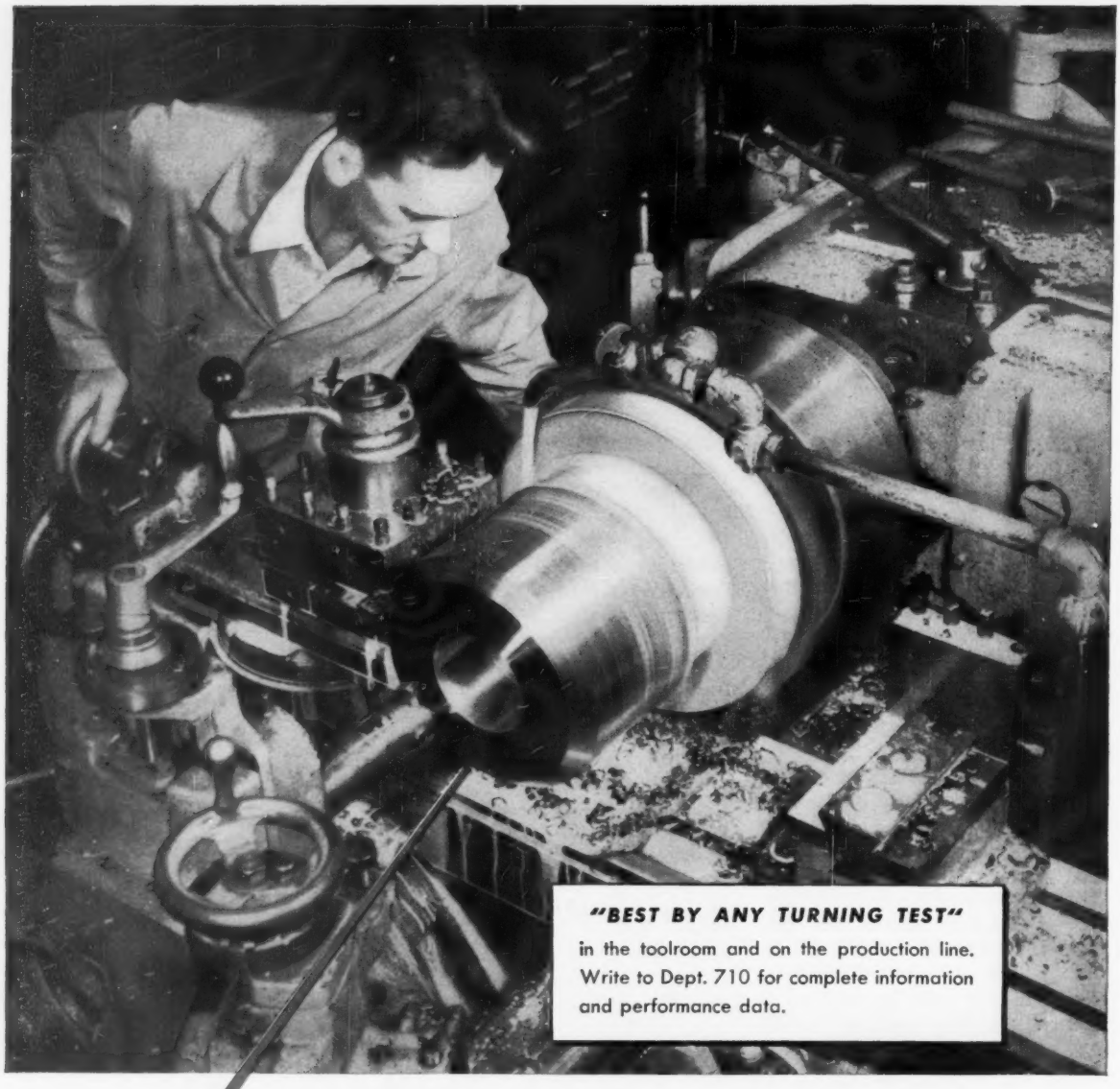


NEW ADDRESSES

F. W. Derbyshire Inc. moved to 265 Bear Hill Rd., Waltham 54, Mass. The firm makes instrument and watchmakers' lathes and attachments.

Pacific Sintered Metals Co., manufacturer of custom molded powdered metal products, moved to 8333 Hindry Ave., Los Angeles 45, Calif.

Louis Levin & Son Inc. moved into larger quarters at 3573 Hayden Ave., Culver City, Calif. The firm makes instrument lathes.


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line. Write to Dept. 710 for complete information and performance data.

Jones & Lamson turret lathes are BUILT and POWERED TO PRODUCE

MORE CHIPS per tool
MORE PIECES per hour
MORE PROFIT per job . . . than any turret lathe of comparable size!

JONES & LAMSON

the man who needs a new machine tool is already paying for it

JONES & LAMSON MACHINE COMPANY, 517 Clinton St., Springfield, Vt., U.S.A. J&L MACHINE TOOL DIV.

Technical Outlook

HIGHER OVEN HEAT PREDICTED— Advent of suitable alloy sheets has permitted makers of industrial ovens to up processing temperatures to 1250° F from a former limitation of 800° F, states H. G. Gehnrich, president, Gehnrich & Gehnrich Inc., Woodside, N. Y. Prediction: Commercial ovens will soon operate above 1400° F. (Some experimental jobs are already in operation.)

COMPUTER DATA SPEEDED— A new portable machine permits bypassing of the time consuming and complex job of translating business and technical data into computer language. The Radac I, as it is called, collects critical data (speeds, flows, temperatures, pressures, and similar material), automatically turns them into computer language quickly and accurately, claims Radiation Inc., Melbourne, Fla.

NEW CONTINUOUS CASTER— Aluminum slugs for impact extrusions are blanked from continuously cast strip made at a new plant of the White Metal Mfg. Co., Hawthorne, N. J. Molten metal solidifies on a wheel 40 in. in diameter producing a strip 8 in. wide, ¾ in. thick that's wound into coils after rolling.

SPEEDIER JOINING— Production scores should be raised soon by faster welding techniques being developed. Steel 0.090 in. thick can be welded at 200 ipm with inert gas or submerged arc techniques. Prediction: The 200 and 300 Series stainless will soon be weldable at 100 ipm.

COMBINATION TRUCK BODY— A Detroit firm is building a refrigerator truck body made of steel and polystyrene panels. It is said to weigh 42 lb per 2 ft section.

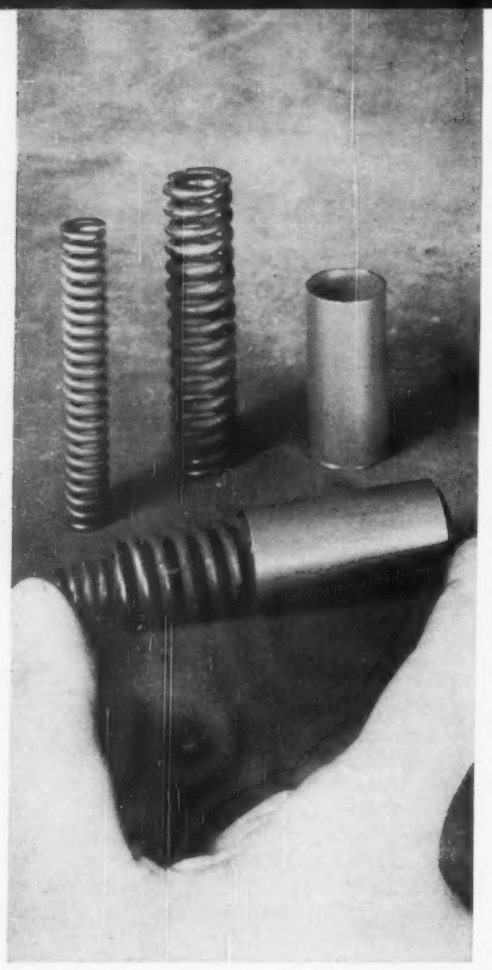
ULTRASONICS SPEEDS PLATING— Tests conducted at a Bureau of Mines laboratory in College Park, Md., indicate that ultrasonic vibrations offer an improved way to stir plating baths. Results, say the scientists, include large increases in cathode current efficiencies, large decreases in cell voltages with widely varying current densities, and a substantially raised current density at which an anode becomes passive (doesn't corrode). They also concluded that ultrasonic agitation is more effective than conventional techniques and that the method may be applied to other plating processes where conventional stirring is impossible or ineffective.

ATOMIC STRIP MINING— Nuclear energy could replace explosives or mechanical equipment for strip mining, construction excavations, and similar digging work, says Gerald Johnson, Lawrence Radiation Laboratory, University of California, Livermore, Calif. Tests already completed indicate excavation costs could be lowered to something under 4 cents a cubic yard. Radiation effects? They're being studied and there is already some evidence they can be controlled.

BETTER ELECTRODE METAL— One of the most difficult problems in plasma generators is electrode deterioration. Fansteel 99 alloy is the most successful electrode material yet encountered, states Dr. William M. Van Camp, research scientist, McDonnell Aircraft Corp., St. Louis.

FEWER SIZES PROPOSED— People who produce and supply flat, ground, tool steel stock are being polled on the need to cut the number of standard sizes being offered. The Commodity Standards Division, Office of Technical Services, Department of Commerce, says the proposal, if approved, will be issued as a formal recommendation.

ANOTHER MONORAIL PROPOSAL— A French group (including Renault) proposes a monorail system for U. S. urban transport which is said to be cheaper than subways. Construction costs: $4 million to $5 million a mile. Each car carries 123 passengers, runs 60 mph, has rubber tires which run inside the monotrack for weather protection and improved traction. The cars are electrically operated.



CHOICE OF ALLOY

Alloy	Suggested Temperature Range
Armco 17-7 PH	To 550° F
NS-A286, Inconel X	550-1100° F
NS-25, Rene 41, S816	1100-1500° F

How to Select The Right Superalloy Spring

Potential applications range from turbine engines for autos to components for automatic toasters. Materials fight heat and corrosion

IF DESIGNS or service problems point to spring failures from heat or corrosion, you may want to consider the superalloys. They're standing up where conventional alloys are impractical.

High temperature springs are being used in many military and industrial products, says V. A. Stanton, chief metallurgist, National-Standard Co., Niles, Mich. You'll find them in aircraft, missiles, nuclear equipment, motors, control systems, and instrumentation.

Turbine engines for automobiles are considered to be a big potential market.

Consumer products could also become a good market. For example: Springs for automatic toasters (they're subjected to temperatures of 400 to 600° F) and springs in temperature control systems for electric irons.

• The higher temperatures make for differences in processing, as well as changes in analysis.

In preparing a list of representative alloys used in high temperature

CHOICE OF TEMPER

Alloy Temper	Operating Temperature
Spring temper or 30%	300 to 600° F
30 or 15%	600 to 900° F
15% or annealed	Over 900° F

springs, Mr. Stanton notes that many are precipitation hardening. He suggests: When it's possible, they should be stress relieved in the range in which the hardening occurs, so the two heat treatments can be combined. Worth remembering: The higher the temperature at which the precipitation hardening occurs, the more stable will be the elevated temperature properties of the springs.

Processing differences become important too. Summing up the results of a long series of tests carried out in co-operation with Armco Steel Corp., Bendix Corp., Hoosier Spring Co., and International Nickel Co., Mr. Stanton says: Temper (the amount of reduction after annealing and, therefore, the hardness due to cold work) should be reduced as the operating temperature rises above 600° F to assure maximum stability. Beyond that, he feels that few generalizations (other than classifications of alloys used) can be made. Breaking down the alloys into groups helps in understanding basic principles and aids in material selection. Final selection, says Mr. Stanton, "rests on individual considerations of corrosion, temperature and load cycling, heat treatment, and fabrication methods."

• Some jobs can be tackled with ferrous base materials.

Ferritic alloys as a class can be considered as modified tool steels, says Mr. Stanton. They contain relatively small amounts of chromium, vanadium, and molybdenum and are quenched and tempered to obtain maximum physical properties. Holding down the alloy content offers the advantage of low cost, but at the same time it limits corrosion resistance in some atmospheres. Hardening must be done after forming the spring in the soft condition, and distortion on quenching is a problem. So ferritic alloys are applied most frequently in larger springs and forms, reports Mr. Stanton.

Ferritic-austenitic alloys are typified by Armco 17-7 PH, which has been used widely up to about 550° F. Armco's newer PH 15-7 Mo has been applied, although not as widely. The 17-7 type alloys contain 5 to 20 per cent of delta ferrite in addition to austenite; they can be precipitation hardened, or hardened by a combination of freezing and precipitation methods.

An iron base grade, A286, is one of the least expensive of the superalloys, says Mr. Stanton. It is precipitation hardening, and the high temperature (1300 to 1400° F) of the reaction means that it can be used over a wide range. The cost of high temperature applications is moderate.

• Nickel and cobalt base alloys have wide utility.

Considerable data on Inconel X, a nickel base material, have been accumulated. Relaxation tests at various stress levels and for different conditions of stress relief are available; they're helpful because a spring may be satisfactory with 15 per cent relaxation in one job while on another the limit may be 2 per cent. Increasing stability means lowering the stress, or going to a different alloy.

Rene 41, a vacuum melted, nickel-chromium-cobalt material, which has been widely applied in high temperature structural designs, is being studied for spring service at 1200° F and above, says Mr. Stanton. Refractalloy 26 and Waspalloy are also being examined for high temperature use.

NS 25 and S 816 are cobalt base alloys which have been used for high temperature springs (see STEEL, Feb. 22, 1960, p. 68) for temperatures of 400 to 1400° F. One application: Holding parts in position for brazing.

• Superalloys take special processing in wiremaking.

Heats of superalloy materials are usually small—sometimes as little as 100 lb. To avoid contamination, special melting processes may be employed.

After some alloys are melted and hot rolled into rods, they are drawn one pass, then centerless ground. While the procedure adds to cost, it produces a surface of spring wire quality. But centerless grinding of the rods is usually limited to 10 or 15 ft. Further drawing in lengths as short as that is not practical, so many welds are used in making up a coil suitable for automatic spring machines. A magnetic material is

Chemistry of Superalloy Spring Materials

ALLOY	CLASS	Co %	Cr %	Ni %	Mo %	Fe %	C %	Al %	Ti %	Cb %	W %	V %	B %
NS-1000	Ferritic	—	4.75 to 5.25	—	1.2 to 1.4	balance	0.37	—	—	—	—	0.4 to 0.6	—
Armco 17-7 PH	Ferritic Austenitic	—	16 to 18	6.5 to 7.5	—	balance	0.09 (max)	0.75 to 1.50	—	—	—	—	—
Armco PH 15-7Mo	Ferritic Austenitic	—	14 to 16	6.5 to 7.5	2 to 3	balance	0.09 (max)	0.75 to 1.50	—	—	—	—	—
NS-A286	Austenitic	—	13.5 to 16	24 to 27	1 to 1.75	balance	—	0.35 MA	1.75 to 2.25	—	—	0.10 to 0.50	—
Inconel X	Nickel Base	1 (max)	14 to 17	69 (min)	—	5.9	0.08 (max)	0.4 to 1	2 to 2.5	—	—	—	—
Refractaloy 26	Ni-Co Alloy	20	18	38	3.2	balance	0.03	0.2	2.6	—	—	—	—
Rene 41	Ni-Co Alloy	10 to 12	18 to 20	53	9 to 10.5	5.00	0.06 to 0.12	1.5 to 1.8	3 to 3.3	—	—	—	0.010 (max)
Waspaloy	Ni-Co Alloy	13.5	19.5	56	4.25	1.00	0.05	1.3	3.00	—	—	—	0.005 (0.062R)
NS-25 (L605)	Cobalt Base	50	19 to 21	9 to 11	—	3 (max)	0.05 to 0.15	—	—	—	14 to 16	—	—
S816	Cobalt Base	40 to 44	19 to 21	19 to 21	3.5 to 4.5	5.0 (max)	0.32 to 0.42	—	—	3 to 4.5	3.5 to 5	—	—

welded in at the joints so that the weld areas can later be identified with a magnet.

Annealing and precipitation hardening require special care because of the high temperatures involved. Special atmospheres are used, or some scale can be removed by vapor blasting.

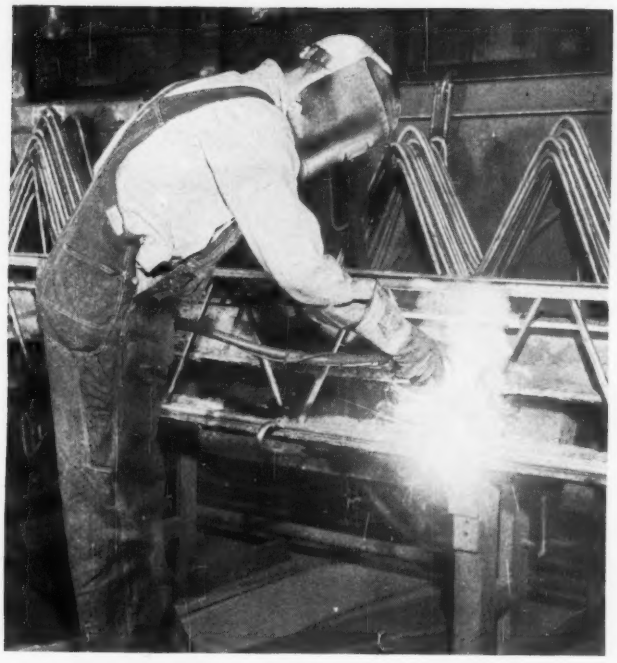
• For high temperature springs, so-called spring temper is not always best.

This hardness, frequently called full hard, is often specified for springs that'll operate at room temperature. But at 500° F and above, high tensile strength may be obtained at the expense of stability. Then design stresses of the spring must be reduced.

As the final reduction in cross section decreases, the alloy becomes more stable at a given elevated temperature if the yield point of the material is not exceeded. Or, looking at the changes from another direction, as operating temperature and stress are raised, the physical properties of the alloy should be reduced from their maximum levels to attain suitable service characteristics. It is particularly true when the temperature goes over 1000° F, says Mr. Stanton.

While aging at higher temperatures will result in overaging, reducing physical properties, the resulting higher stability is often the governing factor, says Mr. Stanton.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Speed of Innershield vs. Manual Electrode

Weld Size (Inches)	Arc Speed (ipm) Manual	Innershield
1/8	18	50
3/16	15	42
1/4	15	25
5/16	11.2	18
3/8	9.1	11

Note: Figures based on 100 per cent operating factor.

Joistmaker goes to semiautomatic method, finds . . .

Vapor Shield Speeds, Upgrades Welds

FASTER WELDS can also be better welds, says Ceco Steel Products Corp., Chicago. The company made such gains when it switched from manual (stick) electrodes to a semiautomatic method in the production of open-web steel joists.

Preliminary results indicate that the semiautomatic Innershield unit will reduce rewelds, company officials told STEEL. In addition, spatter on parts has been reduced, a plus in areas where absolute cleanliness is required.

The company hasn't fully developed cost data. (Innershield wire, it claims, costs twice as much as the E-6012 stick electrodes formerly employed.)

• The Innershield process is said to have two outstanding features: Unusual welding speed and a source of shielding which is completely self-contained. No external flux, gas, or coatings are required.

The secret of the method is a hollow electrode which is fed through a hand welding gun. Materials in the core volatilize to provide a vapor shield, deoxidizer, and flux. Following welding, some slag remains, but it is easily removed.

Previously, the process had been restricted to automatic installations with exceptionally high deposition rates, says the maker, Lincoln Electric Co., Cleveland.

Some of the materials in the wire core are metallic salts and oxides which: 1. Melt at a lower temperature than the electrode. 2. Boil and produce a vapor at a temperature lower than that of molten electrode metal. 3. Are chemically inert.

When the salts hit the arc, they vaporize and expand, forming a shield around the molten metal as it transfers from the electrode to the weld puddle. The other ingredients purify and refine the deposit to produce a higher grade weld.

• Equipment is compact and easily operated, Lincoln Electric claims.

A wire feeder which contains a wire reel and drive rolls pushes the wire and electric current through a cable to a simple welding gun. (It it little more than a nozzle, trigger, and pistol grip, says Lincoln Electric.) To weld, an operator merely pushes the gun along the seam, releasing the trigger when he wants to stop.

A motor-generator power source is employed at Ceco Steel. Welds in the joists are made with a setting of 450 amperes, 28 volts, direct current, positive polarity. Flare buttwelds are longer than 1 in. and join 19/32 in. round web material to 1½ in. angles 3/16 in. thick.

One problem: Ceco wants a better way to transport the cart which holds the spool of wire. (Some joists are 75 ft long.) One solution suggested: Mount it overhead or on a U-channel floor track.

Tooling Trims Chucker Setup Time

Cutting tools are precisely preset in these fixtures

MACHINE DOWNTIME for job changeovers is being slashed 50 to 75 per cent on an automatic chucking machine at Scully-Jones & Co., Chicago. Newly developed quick-set tooling accounts for the economy.

The manufacturer of machine tool accessories has been operating a Warner & Swasey 2AC machine equipped with the new tooling since last September. Results like these are being realized:

• The chucker can be set up to run a new job in 2 hours. Joe Kosinski, works manager, says: "It takes about 4 hours to set up similar jobs with conventional tooling."

• For repeat runs on established jobs, production men can set up the machine and run the first piece in 30 minutes or less. With conventional tooling, the setup for a rerun takes 2 or 3 hours.

The 30 minute setup time for rerunning a job includes installing chuck jaws, changing speed and feed gears, changing trip dogs, installing all the tooling, and cutting the first piece, explains Mr. Kosinski.

• In a time study of the setup for one part, the results were: Change feed and speed gears and set trip dogs, 9 minutes; install chuck jaws and all tools, 13 minutes; run first piece, 4 minutes.

The company has simplified the job of setting up the trip dogs to change speeds and feeds by installing metal scales on the main control drum. Once the trip dogs are positioned on the initial setup, they can be easily repositioned for rerunning the job.

• The new quick-set tooling is for machine tools used for small lot runs.

The company has been selling preset tooling for nearly ten years, but up to now it has concentrated on the continuous production machine. Combined with a program of periodic tool changing, the preset tooling concept has drastically reduced machine downtime for changing or replacing tools and has boosted machine productivity.

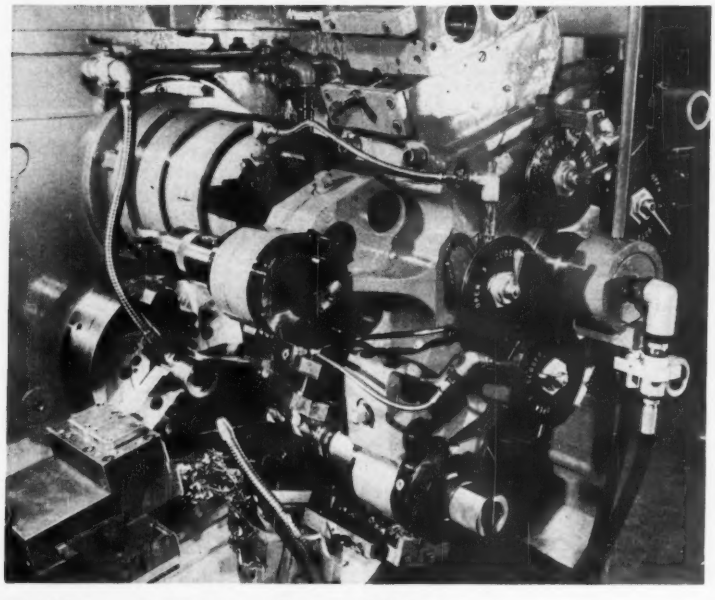
"But the biggest manufacturing problem today is to obtain the low unit cost of high production techniques on short runs," explains Harry Conn, chief engineer. Quick-set tooling reduces the time needed for job changeovers and justifies smaller runs. The company feels it can now run many jobs on the automatic that otherwise would call for turret lathes.

A side benefit cited by setup men: "We can examine the cutting tools visually in seconds and replace them without adjustments."

In a demonstration, the operator removed 11 tools from the machine, placed them on a bench, then put them back in place in 2 minutes 15 seconds. They cut to previous preset tolerances.

J. D. Lockrem, vice president-marketing, cautions: "Our tooling won't make the machine do anything that can't be done with conven-

Holders are for cross slide (left), turret



Holders clamp on the machine

tional tooling. It just makes setup easier and faster."

• Two new hydraulic devices (a chuck for end cutting tools and a clamp for cross slide tools) make the system work.

In the chuck, which locks on a cylindrical toolholder, the inner sleeve is surrounded by hydraulic oil. Applying pressure to the oil causes the sleeve to contract and grip the toolholder along its full length. A positive mechanical locking device on the back of the chuck engages two ears on the holder to prevent tool loosening if the hydraulics should fail.

Heavy disc springs are built into the clamp to apply the pressure that holds cross slide tooling in place. Tools are unclamped by a hydraulic piston.

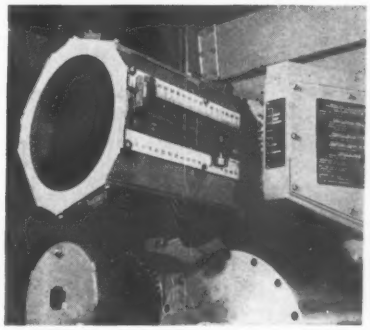
A valve is built into each toolholding device to apply and release hydraulic pressure. The hydraulic power is supplied through a booster pump connected to the shop air supply. To remove a tool, the operator simply opens the valve and slips the tool out. Closing the valve locks the tool in place.

• Presetting is done in fixtures on a workbench.

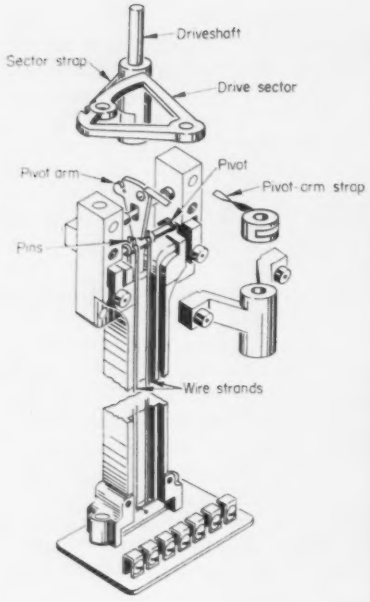
The setup man works from a layout drawing made up by tooling engineers. Tooling is set from base lines that have been established on the machine and transferred to the layout drawings. Scully-Jones guarantees that the cutting tools can be preset for cutting tolerances of ±0.001 in. In practice, however, the setup men have been holding ±0.0005 in.

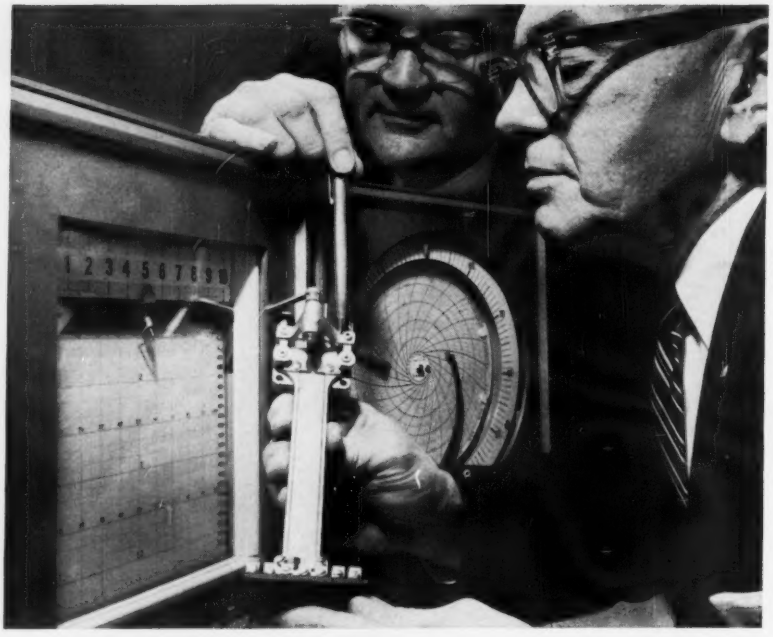
For the last two or three years, the company has used a hydraulic chuck with a built-in oil reservoir on its automatic screw machines. Pressure to lock in tools is applied by a piston actuated by a setscrew. The new system works on the same principle, except pressure is applied through quick throw valves from an outside power supply.

Mr. Lockrem says the initial installation can be fairly costly because it involves designing and installing the chucks, clamps, and power supply. Operating and tool replacement costs aren't any higher than they are for ordinary preset tooling.



Scully-Jones installed these scales on the main control drum. After a job has been set up once, the right trip dog location can be pinpointed on the scales





Electromechanical element sharpens instrument resolution . . .

Strain Gage Rebalancing Boosts Recorder Accuracy

A NEW CONCEPT in potentiometer design is said to improve the accuracy of process variable recording instruments. It will be applied in a new line of instruments that will be produced soon at Brown Instruments Div., Philadelphia, Minneapolis-Honeywell Regulator Co.

An electromechanical strain gage, called a Stranducer, replaces the conventional slidewire as the rebalancing element. The element is said to be extremely accurate and troublefree and to provide infinite resolution because the number of points at which the potentiometer can be balanced isn't determined by a finite number of turns on a slidewire.

• The Stranducer varies the output potential of the measuring circuit to balance the input signal from the process variable.

The unit, which is called the heart of all instruments in the company's ElectroniK 17 line, doesn't have the limitations of slidewires, such as mechanical wear, limited resolution, and bounce, says Walter P. Wills, technical adviser.

Four, prestressed looped wire strands, enclosed in an I-shaped frame, form the variable resistance legs of the measuring circuit. Their resistance varies directly with the tension applied to them by a balancing servomotor. The wires are fastened to a pivot arm; at zero position, they are in equal tension; their resistance is equal. As the pivot arm moves from its zero position, it increases tension on two of the wires and decreases tension on the others. The arm is linked mechanically through sector and strap reduction stages and a drive cable to the balancing motor.

• The potentiometers are adaptable to temperature and nontemperature applications. Modular construction makes them versatile.

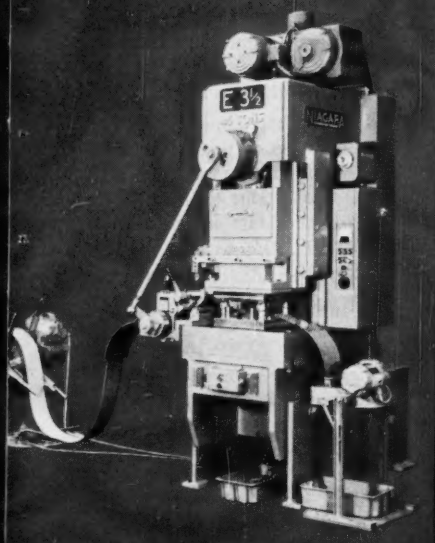
Two, interchangeable amplifiers, with plug-in connections, are available with the potentiometers. One is a solid state circuit; the other uses vacuum tubes and transistors.

Each module is a completely interchangeable assembly or subassembly. The measuring circuit can be changed for different ranges or actuations by substitution of range cards and actuation boards. The drawer type chassis can be pulled out for instrument adjustment or service without interrupting operation.

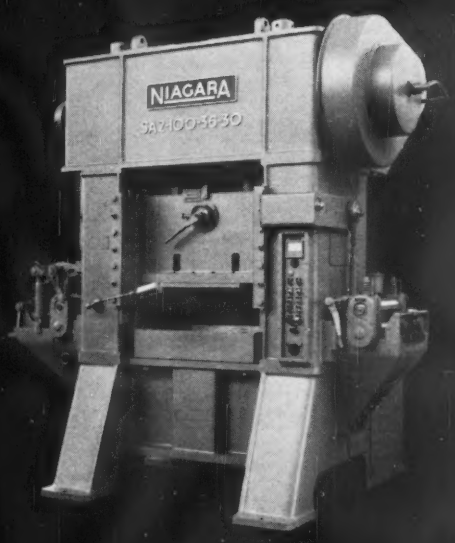
The drive module, which contains the measuring circuit, the rebalancer, constant current unit, input filter, converter, amplifier, and balancing motor, is identical on all models; it is electrically and mechanically interchangeable.

The front (display) module can be removed and replaced easily with a strip or circular chart recorder, or circular scale indicator. Example: A chart record—often desirable in process startup—may not be needed when the process is in operation. The interchangeable module makes it possible to start with a recording instrument and later change to an indicator.

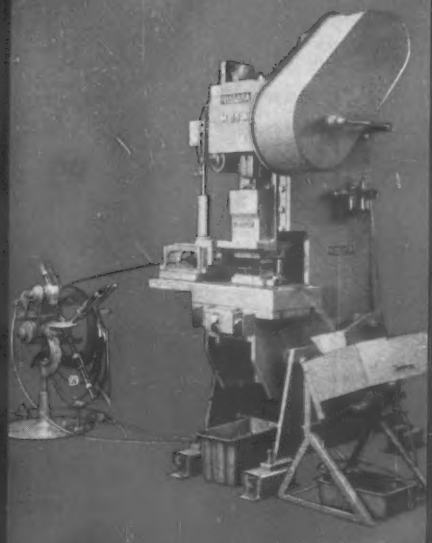
PRECISION PARTS BY THE MILLIONS



SERIES E — FRONT-TO-BACK CRANKSHAFT OBI's
Capacities: 45 to 200 tons.
45-ton model (above) stamps out fuse tips at rate of million/day.



SERIES SA-2 STRAIGHTSIDE AUTOMATICS
Capacities: 25 to 300 tons.
100-ton package (above) includes double roll feed, stock reel, scrap cutter.



SERIES M — ULTRA-HIGH SPEED OBI's
Capacities: 22 to 60 tons.
35-ton model shown operates at adjustable speeds up to 1000 spm and produces parts at rate of million/day.

3 great Niagara lines excel in automatic, high speed, progressive die work

Premium construction: It's the key to premium performance here! These modern Niagara presses are designed strictly for automatic, high speed, progressive die work.

Model for model, they'll turn out more parts per hour than conventional presses of equivalent tonnage can even approach. Far heavier and more massive, they have the ruggedness, rigidity, and stamina to run vibration-free at high speeds.

Providing more guiding surface, their gibbing holds slide and bed in precise alignment for precise production, longer periods between die grinds, and longest possible die life.

But this just begins to tell the story . . .

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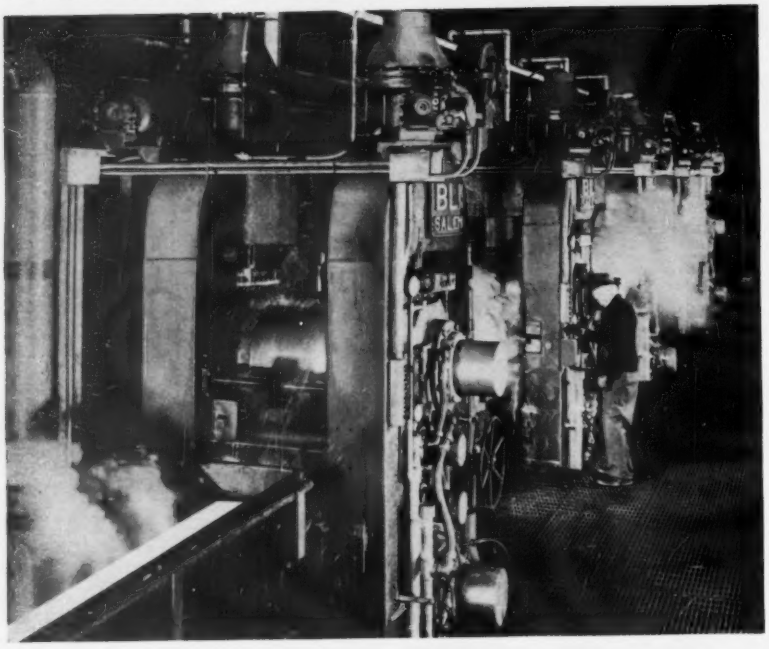
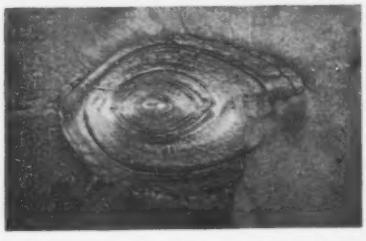


Uneven wear in hot strip mills causes chipping



of work rolls and backup rolls . . .

Spalling Causes Are Sought By Mill Rollmakers, Users

J. D. KELLER
Consulting Engineer
Associated Engineers
Pittsburgh

WHY do mill rolls spall?

The solution to that perplexing problem has been sought for several years by the Joint Roll Research Committee (Association of Iron & Steel Engineers and the Roll Manufacturers' Institute). The research program is still in progress.

Evident almost at once: Spalling might be greatly accelerated by nonuniform roll wear.

When rolls are badly worn, the load is unevenly distributed over the length of the work rolls and the backup rolls. Load in pounds per inch length (near the middle of the roll) is only about one-third of the average load. Near the ends it reaches its peak—almost twice the average load.

Calculation of stresses at the contact of work rolls with backup rolls shows that near the ends the unit load of 101,000 lb per inch length would produce a compressive stress of 242,000 psi at the contact surface. Because it is a compressive stress, and because lateral restraining forces are exerted on the highest stressed parts by adjacent material of the roll, the material may be able to stand the stress.

But shearing stresses are produced in the backup and work rolls. They reach a maximum of about 74,000 psi about 0.21 in. below the surface. The stresses are repeated but not alternating, ranging from zero to 74,000 psi at each contact (once every revolution). Alternating or reversed shear stresses also occur, about 0.13 in. below the surface, ranging from plus 63,000 to minus 63,000 psi, once every revolution.

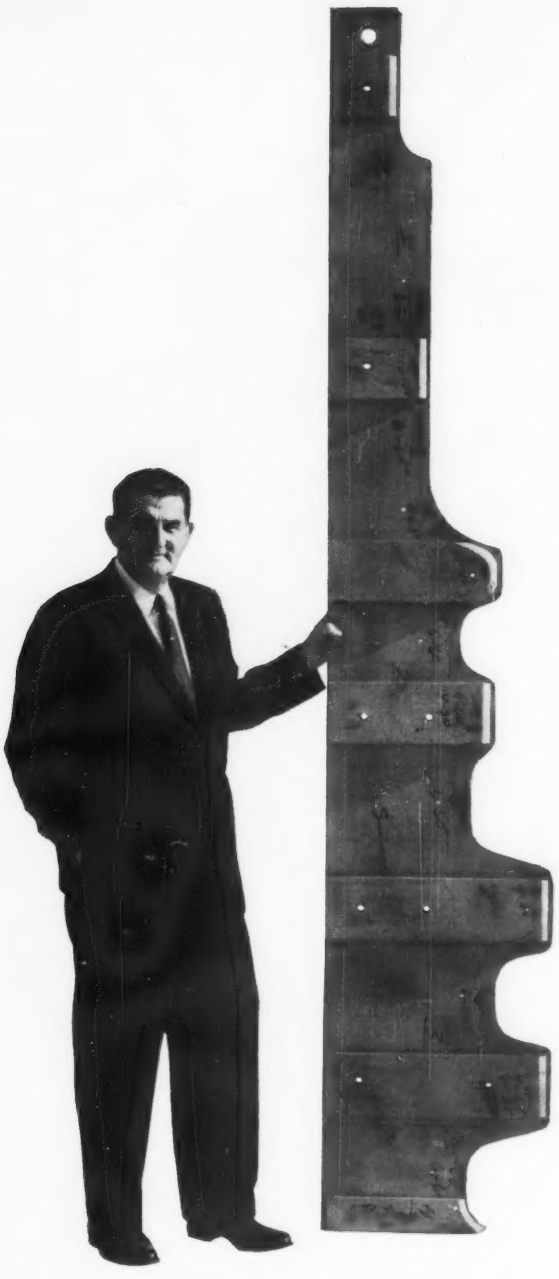
• Many spalls have been studied, photographed, and classified by type, but experts don't always agree on their origin.

Spalls like those shown in the accompanying photographs (furnished by Prof. J. V. Latorre, of Syracuse University Research Institute) may originate as fatigue cracks that start slightly below the surface of the roll material. Such cracks can be caused by repeated or alternating shear stresses; they act as stress raisers in the brittle material and may produce a five to tenfold magnification of stress. That would cause cracks to penetrate gradually into the roll, and outward to the surface. But it isn't certain that cracks start at the rather small depth below the surface (where shear stresses are greatest) or that they start below the surface at all.

Some observers are reasonably sure that cracks start at the roll surface; others think they start below the surface, often at a considerable depth. It is likely that spalls occur in both ways.

Tangential forces caused by friction may produce increased stresses at the surface. And corrosion fatigue cracking may be caused by alternate wetting and drying, by wedging action of fluid penetrating

(*Please turn to Page* 108)



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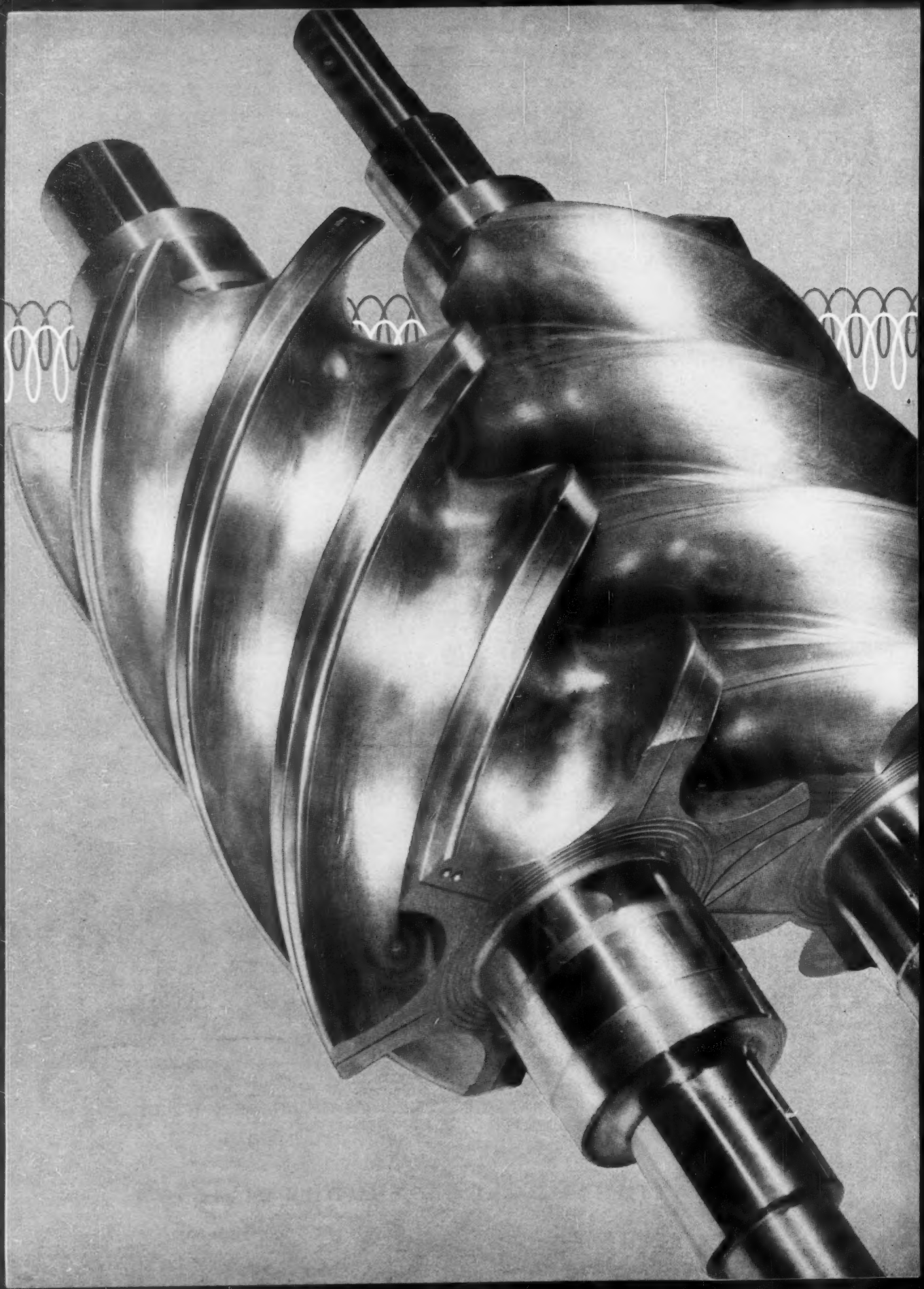

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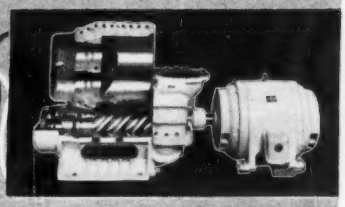

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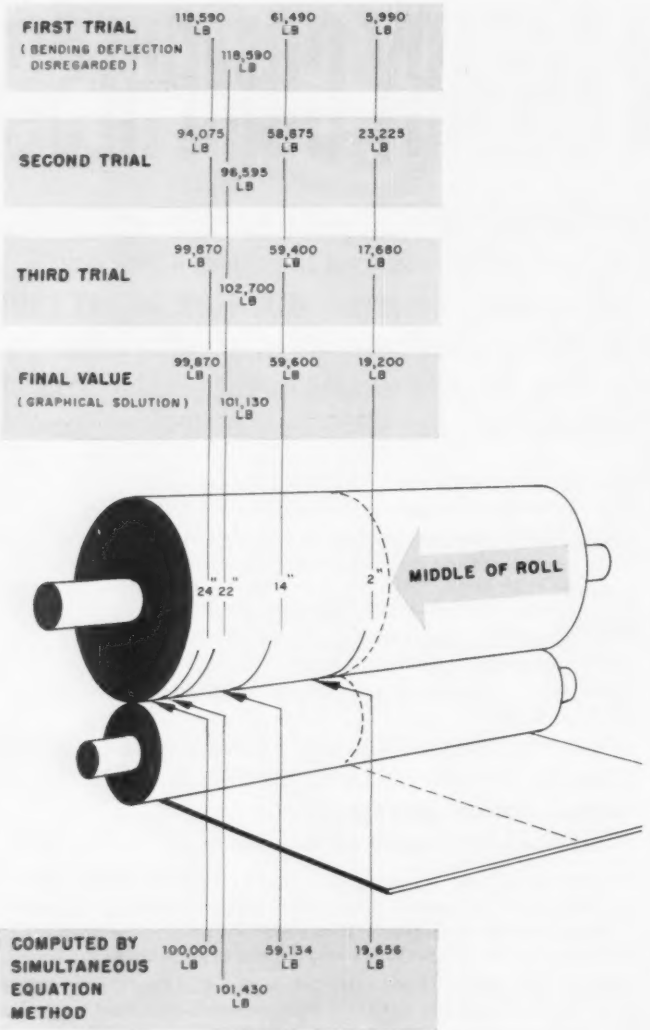
Graphical and mathematical methods offer compatible results in determining roll load distribution in pounds per inch of length



(*Continued from Page* 104)
into microscopic surface cracks, by chemical or mechanical action of cooling water or steam, by temperature stresses from skidding, and by plastic flow conditions in the rolls, near the point of load application. But the probability of trouble is increased by high mechanical stresses. That is why accurate determination of load distribution along the roll length is important.

• Reduction of loads on the rolls doesn't seem to reduce spalling significantly.

It might seem possible to save rolls or to retard spalling by reducing the total load on the mill since the stresses would be expected to vary in proportion to the load—if strength of roll material isn't greatly exceeded by load stresses. But that isn't the case when the rolls are worn.

In a typical situation, calculations show that a 54½ per cent total roll load reduction cuts loading near the roll ends by only 32 per cent and shearing stresses by only 18 per cent.

Reason for the surprisingly small decrease of unit force and stress: Under the lighter load, the wear gap doesn't close completely near the middle of the roll length. The gap remains open for about 18 in. and the load is carried on only about 30 in. of contact length.

• The development of techniques to retard spalling can improve quality of flat products and make rolls last longer.

Mill operators and owners know that spalling of work rolls can cause defects in the strip surface, making the product unacceptable; it can cause trouble in the coiler because of "ridge rolling"; and it may even cause roll breakage. Damage to backup rolls interferes with their proper function—supporting the work rolls. It can cause marking of the work roll surface that may be transferred to the strip. It may cause repeated spalling of the work rolls, or even roll breakage.

Backup roll spalling is also objectionable. The large rolls are extremely expensive, and removing them from the mill for redressing is a major operation.

• Basic investigation by the committee: Measurement of wear and its distribution along the roll length, in the work rolls and backup rolls, and contour changes caused by thermal expansion.

Measurements were made on three hot strip mills by Dr. C. E. Peck, then at Carnegie Institute of Technology. The work was taken up by the late Dr. George Sachs of Syracuse University Research Institute and is being continued by his associate, Professor Latorre. Measurements are being made on

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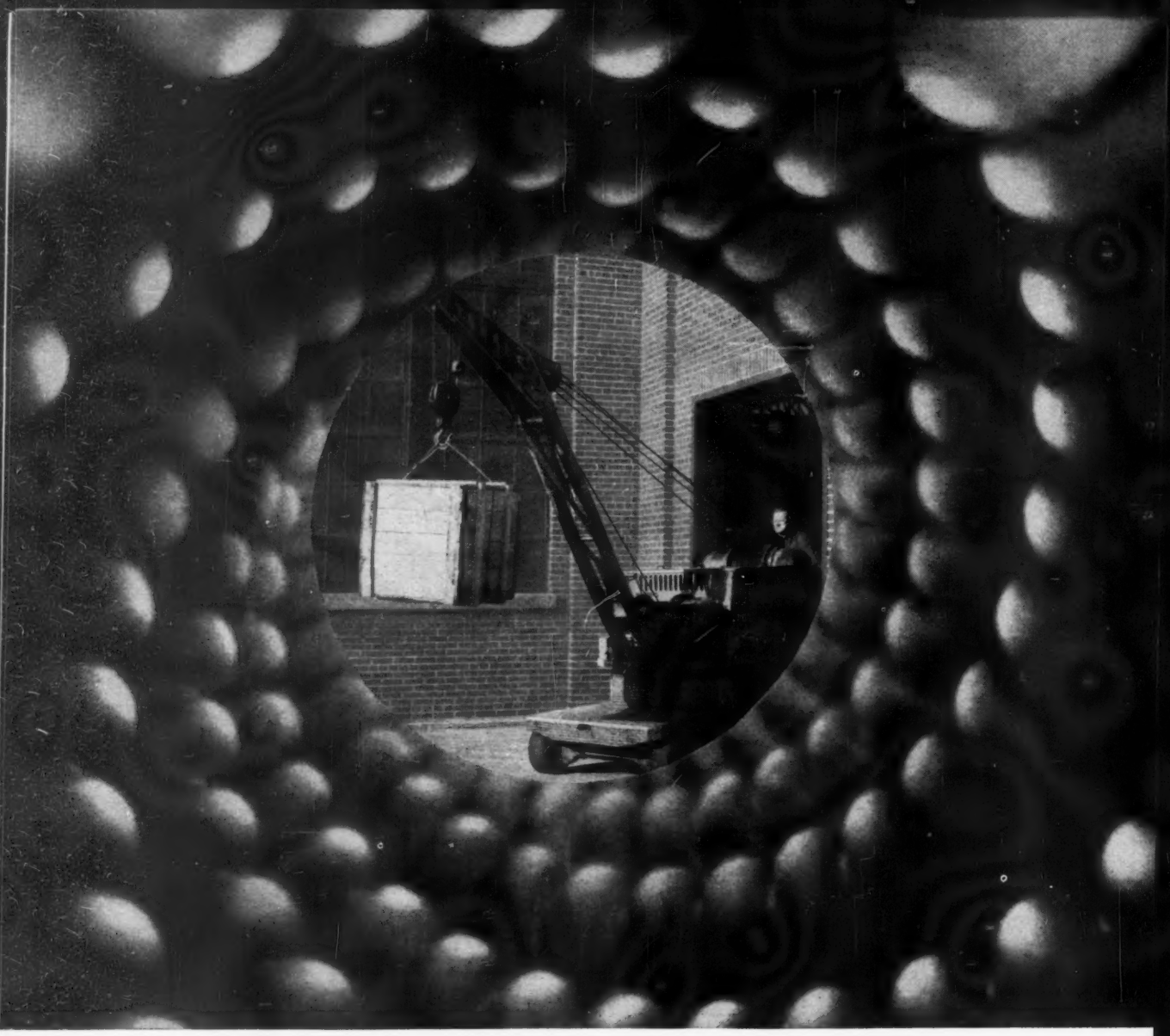

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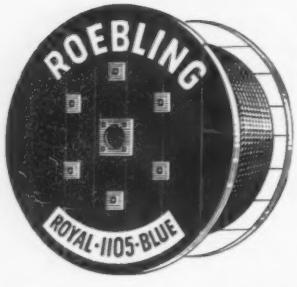

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additional hot strip mills and on a cold strip mill.

Accurate measurements are extremely hard to obtain. They must not interfere with mill operation or output. Dimensions can usually be measured only after the rolls have been removed from the mill for redressing (and not always at a set time after removal). Result: Rolls have cooled to varying degrees when their contours are measured, and temperatures must be taken at various points along their length, while they are in operation, so corrections can be made for thermal expansion.

Special apparatus for measuring the large rolls had to be designed and constructed (or obtained on special order). But satisfactory techniques were finally developed, and consistent measurements of roll contours or wear patterns have been obtained for representative mills.

• Next step: Use of the measurements to determine load distribution along the roll length and the stresses produced.

In 1958, the author developed a mathematical method for applying the measurements. Half length of the work roll-backup roll contact line was divided into six equal sections; six simultaneous equations were written to correlate bending and shear deflections and the radial deformation of both rolls.

In 1959, the author derived a combination graphical and numerical method for determining pressure distribution between the work and backup rolls. It is faster than the simultaneous equation method and rivals it for accuracy.

Finishing stand work rolls are usually double poured, alloy, cast iron rolls. They have a hard, chilled, white iron shell, initially about 1½ in. thick, with a surface hardness of about 60 Rockwell C. Backup rolls are usually cast steel, slightly softer than the work rolls. In spite of their hardness, work rolls are worn so rapidly by the hot strip that they must be taken from the mill for redressing about every 8 hours. Backup rolls, which do not normally come in contact with the strip, wear less rapidly. But after two weeks they have worn about as much as work rolls did in 8 hours, so they must be redressed.

• Roll deformation helps compensate for uneven wear.

A gap caused by uneven wear exists between the rolls. If the rolls were completely rigid, the work roll would be supported by the backup roll over a length of only 3 in. near each end, and pressure there would be intolerably high. But the rolls deform elastically, relieving the stress concentration to some extent.

The elastic yield consists of bending and shear deflections and radial deformation.

The work rolls are bent away from each other by pressure from the hot strip; work rolls are bent toward each other, and backup rolls are bent away from the work rolls by mutual pressure. The shape of the pressure curve isn't known. Backup rolls are bent toward the work rolls and toward each other by bearing reaction.

Distribution of strip pressure on the work rolls is practically uniform along the strip width. Bending and shear deflections of the work roll can be calculated by standard equations. The same procedure can be followed to calculate the bending and shear deflections of the backup roll caused by bearing reaction.

But bending and shear deflections are less important than radial compression of the rolls, without which satisfactory strip rolling would be impossible.

Bending deflection caused by pressure between the work roll and the backup roll (for any pressure distribution) may best be figured by the graphical method originated by O. Mohr in Germany. Shear deformation can also be calculated by the graphical method, but it is more easily determined by numerical summation.

• Calculation of roll load distribution involves a rapidly converging series of approximations.

The starting point: The gap, or open space between the work roll and backup roll when they are in contact but not under pressure. For the first trial, roll axes are assumed to move closer together, parallel to each other, and without bending or shear deflection, until the gap is partially or completely closed and the total load reaches any set, desired value. The unit load (in pounds per inch length) for each decrease of distance between roll centers is calculated for all points along the length.

The half length of contact between the work roll and backup roll is divided into a number of equal spaces (preferably 10 or 12, for accuracy); summation of loads on all those spaces determines the total load. Unit force is naturally greatest where the initial gap was least—usually near the middle of roll length in the earlier stands of the hot strip mill and near the ends of roll contact in the later stands.

Load distribution computed by considering gap closure from radial deformation alone is used as the first trial load. Bending deflections caused by that load distribution are found by the previously mentioned graphical method or numerically, by considering the load on each of the equal spaces as a concentrated load at its middle. Shear deflections are also calculated for the first trial load.

Deflection of the work roll tends to close the gap near the middle of the roll length, but deflection of the backup roll tends to open the gap there. The total bending and shear deflection of the backup roll must be subtracted from the total work roll deflection.

Net deflection is then deducted from the initial gap to give a deflection-modified gap at all points along the half length for the second trial.

Loads corresponding to the modified gap are then determined. If necessary, the deflected roll center lines are moved slightly toward or away from each other to give the same total load, for the second trial.

Bending deflection is then calculated by the graphical method for the new load distribution, and a new deflection-modified gap is obtained for all points along the roll length. That gap is found to be between the result in the first trial and the initial gap. Results of successive trials oscillate about the true value—first too high, then too low, but converging rapidly toward the real value.

Mathematical calculations developed by the author are made to speed the convergence on a final true value, usually determined on the third trial.

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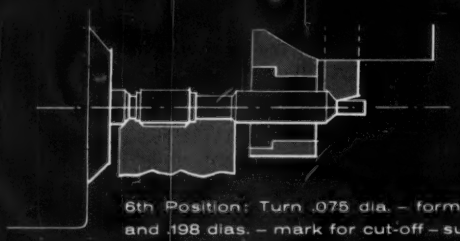
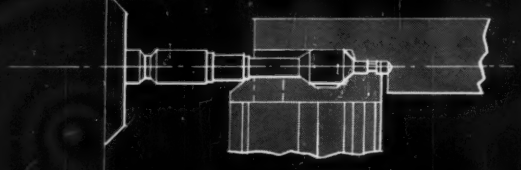
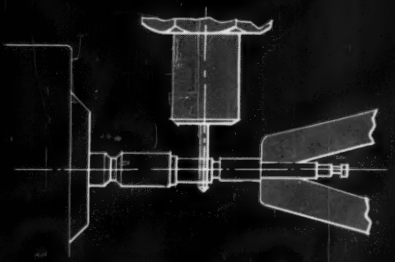


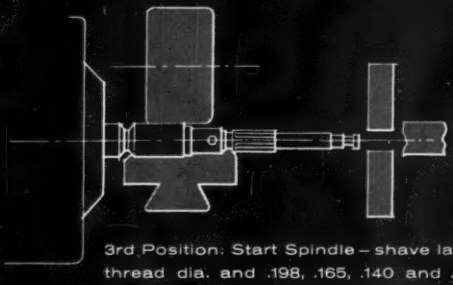
6th Position: Turn .075 dia. – form .165 and .198 dias. – mark for cut-off – support



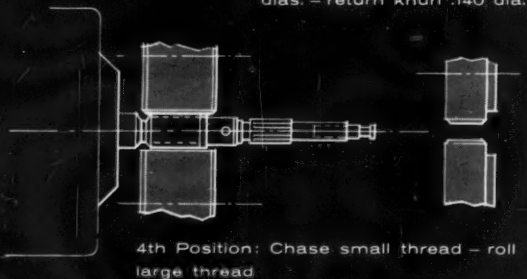
1st Position: Support – form knurl dia., .055 and .075 dias.



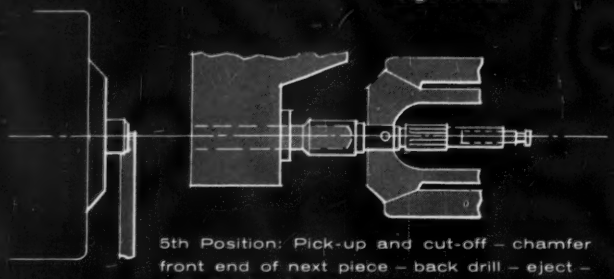
2nd Position: Stop spindle – cross drill – hollow-mill small thread dia.



3rd Position: Start Spindle – shave large thread dia. and .198, .165, .140 and .130 dias. – return knurl .140 dia. face end



4th Position: Chase small thread – roll large thread



5th Position: Pick-up and cut-off – chamfer front end of next piece – back drill – eject – chamfer front end

Total Machine Time – 5 Seconds

. . . also . . . cost-per-piece is substantially reduced . . . part uniformity and quality definitely improved . . . scrappage all but eliminated.

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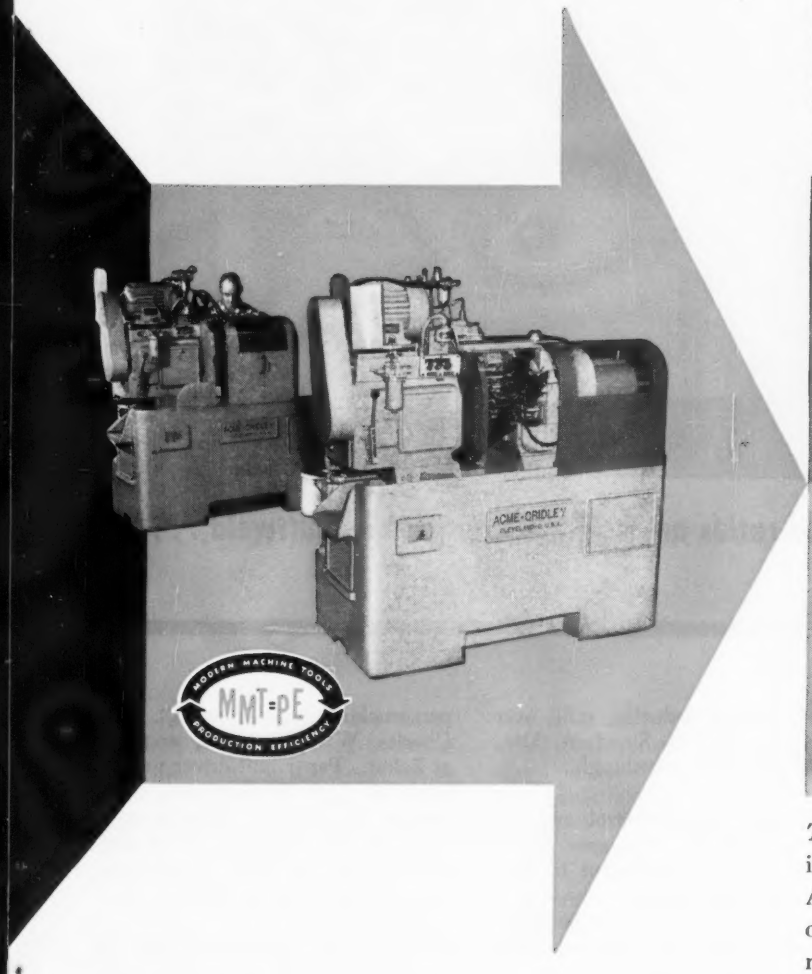

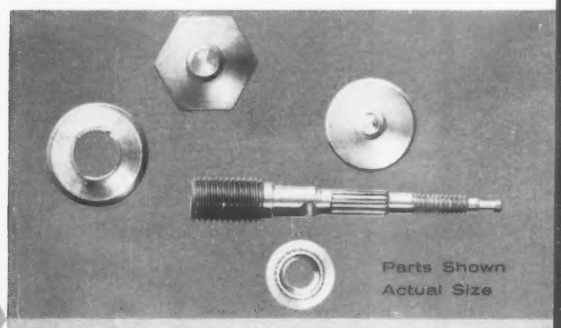

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Hydromechanical Drives Show

Interstand speed ratios are held constant on this buttweld . . .

VARIABLE SPEED DRIVES that use hydraulic fluids are being parlayed with differential gearing to control multistand operations in the paper industry. They may gain even greater popularity as an automation tool in metalworking.

Several of the systems are used in a new, continuous, buttweld pipe mill at the Lorain (Ohio) Works, National Tube Div., United States Steel Corp. The hydraulic drives, coupled to mechanical, differential gearing, maintain constant interstand speed ratios in the mill, which is driven by one large, direct current motor.

A variable speed, hydromechanical unit—with hydraulic components supplied by Oilgear Co., Milwaukee, and gearing from Beloit Iron Works, Beloit, Wis.—is used on each stand. The six stand, form and weld mill and the seven stand, stretch reducing mill were built by Aetna - Standard Div., Blaw-Knox Co., Pittsburgh.

• Variable speed control and accuracy, vital in the paper industry, are equally important in metalworking applications.

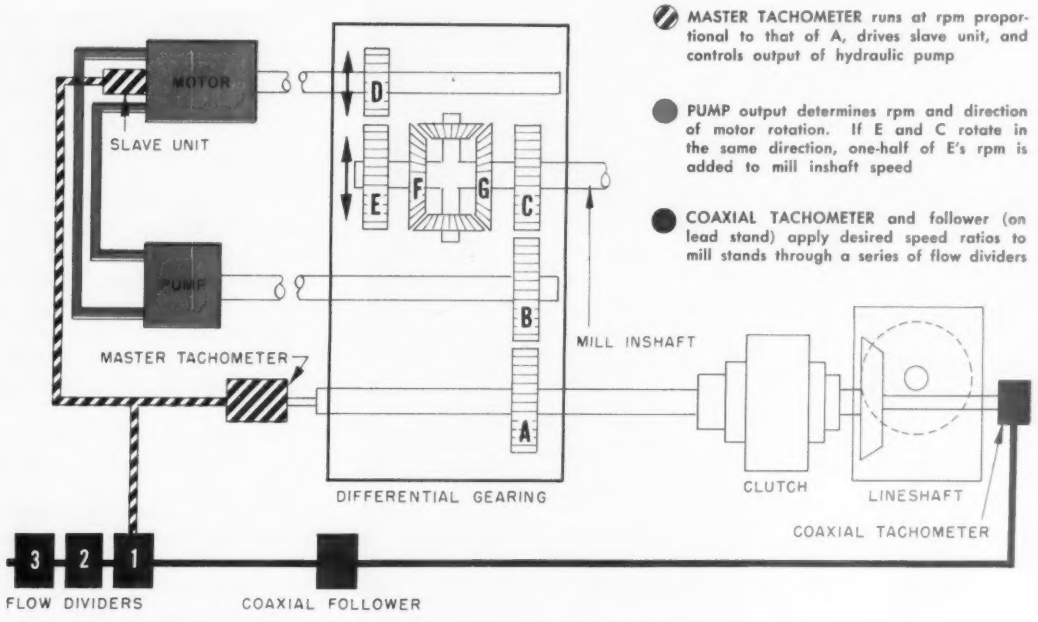
The right tension must be maintained on paper in process, to keep it from tearing and to allow for shrinkage as it dries. The same kind of speed control is necessary in metalworking processes, to insure uniform dimensions in the wire, bars, strip, pipe, or tubing being processed.

The differential unit is a hard drive, with no resilience in the load; it is said to maintain an extremely tight speed ratio between stands of a multiunit system. The differentials used at Lorain have a wider speed range than those used on papermaking equipment, says Charles W. Modersohn, engineer at Beloit. Paper mill drives usually have a 4 to 8 per cent speed change; the system used on the new buttweld mill permits a speed variation of plus or minus 30 per cent, with 0.1 per cent accuracy.

• Driving all differential units off a single lineshaft insures constant speed ratios between stands, even when the speed of the prime mover varies.

The front of the differential gearing is driven by the lineshaft at an adjustable constant speed and provides torque to turn the output shaft. The lineshaft also drives a variable displacement, hydraulic unit, or pump. Power from the pump turns a fixed displacement, rotary, hydraulic motor, which is geared to the back of the differen-

Potential in Automation


MASTER TACHOMETER runs at rpm proportional to that of A, drives slave unit, and controls output of hydraulic pump
PUMP output determines rpm and direction of motor rotation. If E and C rotate in the same direction, one-half of E's rpm is added to mill inshaft speed
COAXIAL TACHOMETER and follower (on lead stand) apply desired speed ratios to mill stands through a series of flow dividers
MOTOR
SLAVE UNIT
PUMP
MASTER TACHOMETER
D
E
F
G
C
B
A
MILL INSHAFT
DIFFERENTIAL GEARING
CLUTCH
LINESHAFT
COAXIAL TACHOMETER
3
2
1
FLOW DIVIDERS
COAXIAL FOLLOWER

. . . pipe mill by a hydraulically controlled, differential drive

tial unit. The pump and motor comprise a variable speed transmission that can handle loads up to 215 hp without gearing; the gear units used on the buttweld mill permit the transmission to control loads up to 700 hp.

When fluid from the hydraulic pump causes the hydraulic motor on the back of the differential to turn the back of the differential gearing in the same direction as the mill inshaft (differential output), one-half the speed of the differential rear gear (rpm) is added to the rpm of the mill inshaft. When the rear gear is turned in the direction opposite that of the front gear, mill inshaft speed is reduced.

An electric servomotor, controlled from the mill pulpit, varies oil output from the variable displacement unit. By controlling the volume of oil pumped by the variable displacement unit (and the speed of the hydraulic motor), it is possible to vary the speed of the mill inshaft by large or small degrees.

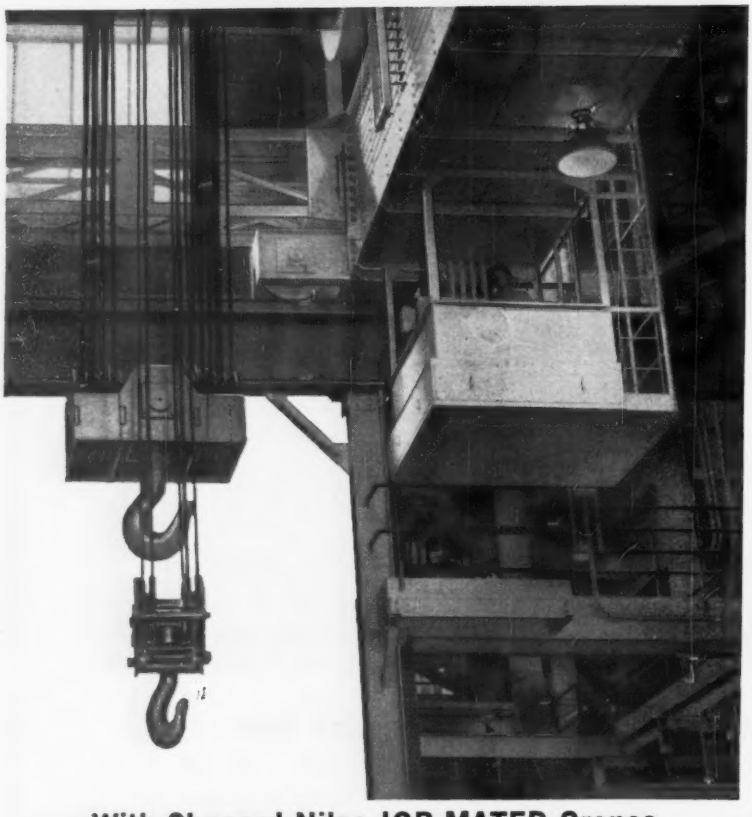
• Accuracy of the drive is improved by the ratio of the variable horsepower to the constant horsepower.

Improvement of accuracy is inversely proportional to the amount of speed change made possible by the variable speed transmission, says Ransom Tyler, Oilgear's chief engineer. If the variable speed drive fluctuates 1 per cent and the power input from the variable speed drive is only one-tenth of the total, speed input from the variable system is only one-tenth of the total. Variation on the main output of the differential drive (mill inshaft) is only one-tenth of 1 per cent.

A master tachometer, running at a speed proportional to the lineshaft rpm, and a fixed displacement, hydraulic slave unit, running at the same speed as the hydraulic motor in the variable speed drive, comprise a smaller variable speed system. It is purposely run at extremely light loads for high accuracy. The smaller system controls the oil output from the larger variable displacement unit, to correct variations from the desired speed ratio.

Coaxial adjustment of stand speeds to compensate for pipe elongation in the mill is done by another tachometer system that's driven off the first stand of the mill. The coaxial tachometer drives a hydraulic follower and a series of flow dividers that keep successive mill stands in step with the forming operation.

The Shortest Distance Is OVERHEAD



With Shepard Niles JOB-MATED Cranes

Traveling cranes deliver the goods **directly,** from point to point within your plant or warehouse, or even from one building to another.

They move masses of material faster, more efficiently–speed up production–because they travel **over** obstacles, not **around** them. And they leave passageways, work areas, and grounds free of moving equipment, with greater safety for your employees and materials.

Best of all, traveling cranes allow you to increase your useable storage capacity by eliminating aisles, and enabling you to store material up to the beams.

Shepard Niles JOB-MATED Cranes with auxiliary hoists are not merely handling devices, but versatile, highly engineered machine tools that contribute directly to increased production and profits. You'll find them ideally suited for your production and storage requirements. Write for complete details on how Shepard Niles JOB-MATED Cranes will improve your profit picture.

Member of Electric Overhead Crane Institute
America's Most Complete Line of Cranes and Hoists

SHEPARD NILES
CRANE AND HOIST CORPORATION

1162 Schuyler Ave., Montour Falls, N.Y.

Radial Drill Speeds Machining of Press Parts

Proper use of a radial drill is said to have reduced labor costs 30 per cent for the Ghormley Engineering & Mfg. Corp., Ft. Worth, Tex.

The product: An offset press for newspaperwork. Its competitive price is partly due, say Ghormley officials, to the more efficient operation of the radial drill.

Printing press parts vary from less than 1 lb to more than 1000 lb. The Ft. Worth firm employs brass, aluminum, steel, and cast iron pieces which are drilled, reamed, spot faced, countersunk, counterbored, tapped, and bored with the radial drill. The machine has proved to be flexible and easy to handle. It has operated for more than three years on two shifts (more than 9000 hours) with no maintenance, the company claims.

The drill, made by Morris Machine Tool Co., Cincinnati, has an 11 in. column, a range of feeds from 0.004 to 0.025 in., and spindle speeds from 44 to 3000 rpm. Controls are centralized. A fully enclosed elevating mechanism with an electric column clamp provides safety and easy operation. The head is mounted on roller bearings.

Jumbo Aluminum Ingots Poured for Nuclear Rockets

Aluminum cups drawn from circles 8½ ft in diameter and 4½ in. thick are going into test reactors being constructed as part of the Rover program for nuclear rocket development.

The cups started out as four, 7 ton, aluminum ingots, poured at Kaiser Aluminum & Chemical Corp.'s Ravenswood, W. Va., Works. Each ingot measured 14 x 4½ x 1¼ ft. Further processing included hot rolling to gage, stretcher leveling, and stress relieving on a 15,000 ton plate stretcher. The material was then sawed into the huge circles.

The circles were transformed into cups at ACF Industries Inc.'s American Car & Foundry Div. and shipped to ACF's Albuquerque, N. Mex., Div. for final fabrication.

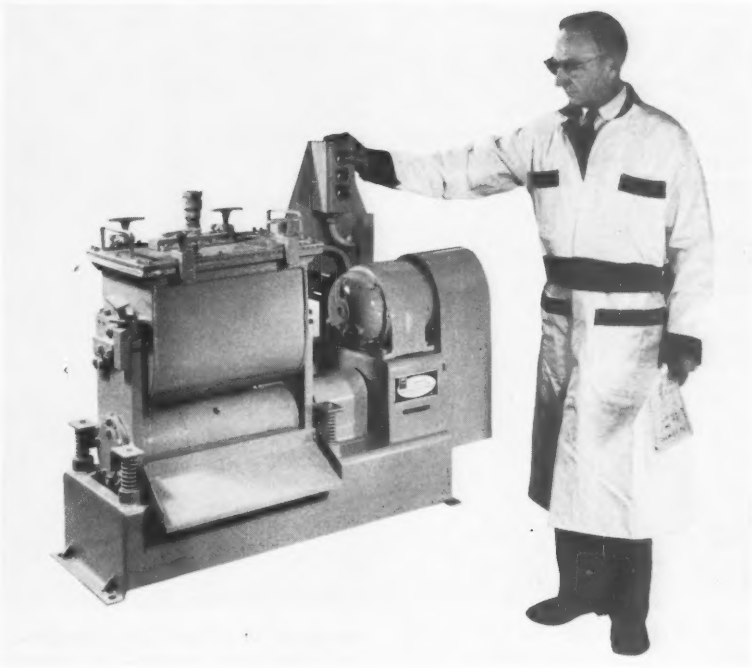
Finisher Can Be Tilted for Rinsing While Vibrating

HERE is a 1 cu ft Vibrator finishing unit (Model HD-1016) that can be tilted for faster rinsing while still vibrating. A rinse cover, using a Lorco manifold system for spraying water throughout the work, is included.

With a special punch plate screen to fit the bowl top, the vibrating-while-tilted feature could also facilitate separation of fine or fractured chips from the rest of the media and in some cases could be used to separate parts from the media.

The machine is 10 in. wide, 16 in. long, and 13 in. deep with a $\frac{1}{2}$ in. rubber lining throughout. A variable amplitude shaft is adjustable from 0 to $\frac{1}{4}$ in. (amplitude). The frequency is variable within a range of 700 to 2100 cycles per minute. Power is supplied by a 2 hp motor.

For further information, *write* Lord Chemical & Equipment Div., Wheelabrator Corp., York, Pa.

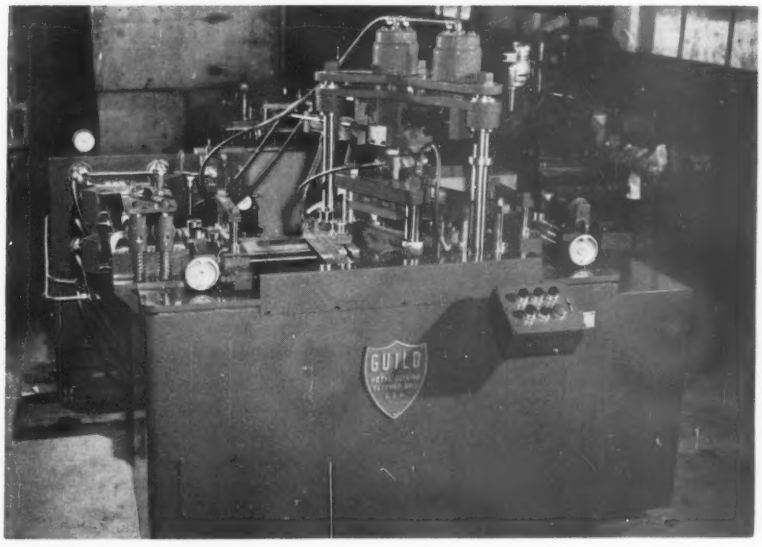


Mash Seamwelder Turns Out Continuous Strip Fast

CONTINUOUS strip for roll forming, tube manufacturing, punch press operation and coil strip processing can be provided by an automatic combination shear and end welder.

The rocker die combination unit (Model RD-907) uses the mash seamwelding process. A big feature is fast cycle capacity. Complete operation time for clamping, shearing, and welding will range from 15 to 25 seconds, depending on material thickness and width. The company says production can be increased as much as 30 per cent.

The machine welds continuously from edge to edge and forms a joint with parent metal strength which can be used in slitting, roll

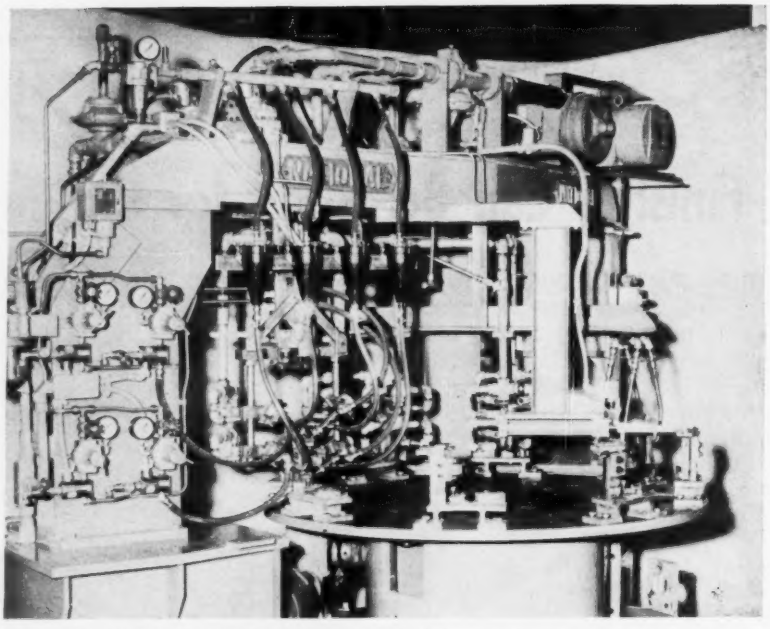


forming, tubemaking, coil buildup, annealing, and paint lines without damage to knives or rolls.

Strip alignment is maintained by containing the trailing and leading coil ends in four side guide rolls prior to clamping. The machine is delivered complete with hydraulically operated entry and exit strip clamps, die set shear, weld clamps, weld travel unit, indexing platen, and seamwelding control panel. Gaging, indexing, and welding operations are automatic and do not require an experienced operator.

A coil end detection control is optional. The control uses sound waves reflected from the strip to detect coil ends, stop the strip, and start the exit end cycle of the machine.

For further information, *write* Guild Metal Joining Equipment Co., 7280 Wright Ave., Bedford, Ohio.



PART LOADING IS ONLY OPERATOR FUNCTION on this automatic, eight station, dial feed brazer. Automatic application of paste is a special feature. The company reports the unit has wide application where a brazed joint is indicated, but where an oven is uneconomical. Carburetor parts and filler necks on portable gas tanks are cited as examples. In assembling an accelerator linkage of two levers and a rod, production of 300 units an hour is reported. For further information, **write** National Electric Welding Machines Co., 1846 Trumbull St., Bay City, Mich.

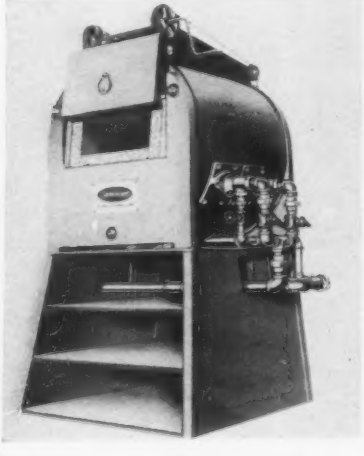
Gas Fired Furnace Has Wide Temperature Range

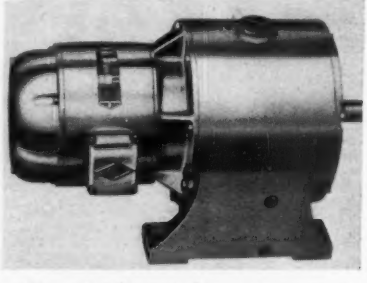
THE WIDE range furnace introduced by Sunbeam has a temperature range from 300 to 2400° F. The company says it can be used for practically every heat treating process, including annealing, pack carburizing, hardening, normalizing, preheating, stress relieving, and tempering.

Both ferrous and nonferrous alloys may be heat treated under accurate temperature control. Burners have a 95 per cent turndown ratio for close temperature control and heat distribution.

The furnace is available for gas fired heating in three standard sizes with work areas ranging from 4 in. high x 8 in. wide x 12 in. deep to 9 in. high x 15 in. wide x 24 in. deep.

For further information, *write* Sunbeam Equipment Corp., 180 Mercer St., Meadville, Pa.





For further information, *write* Reuland Electric Co., Alhambra, Calif., or Howell, Mich.

Motor and Gear Reducers Packaged in Many Ratings

HELICAL Motoreducers made by Reuland are offered in an integral motor and gear reducer package in all ratings from ½ through 50 hp.

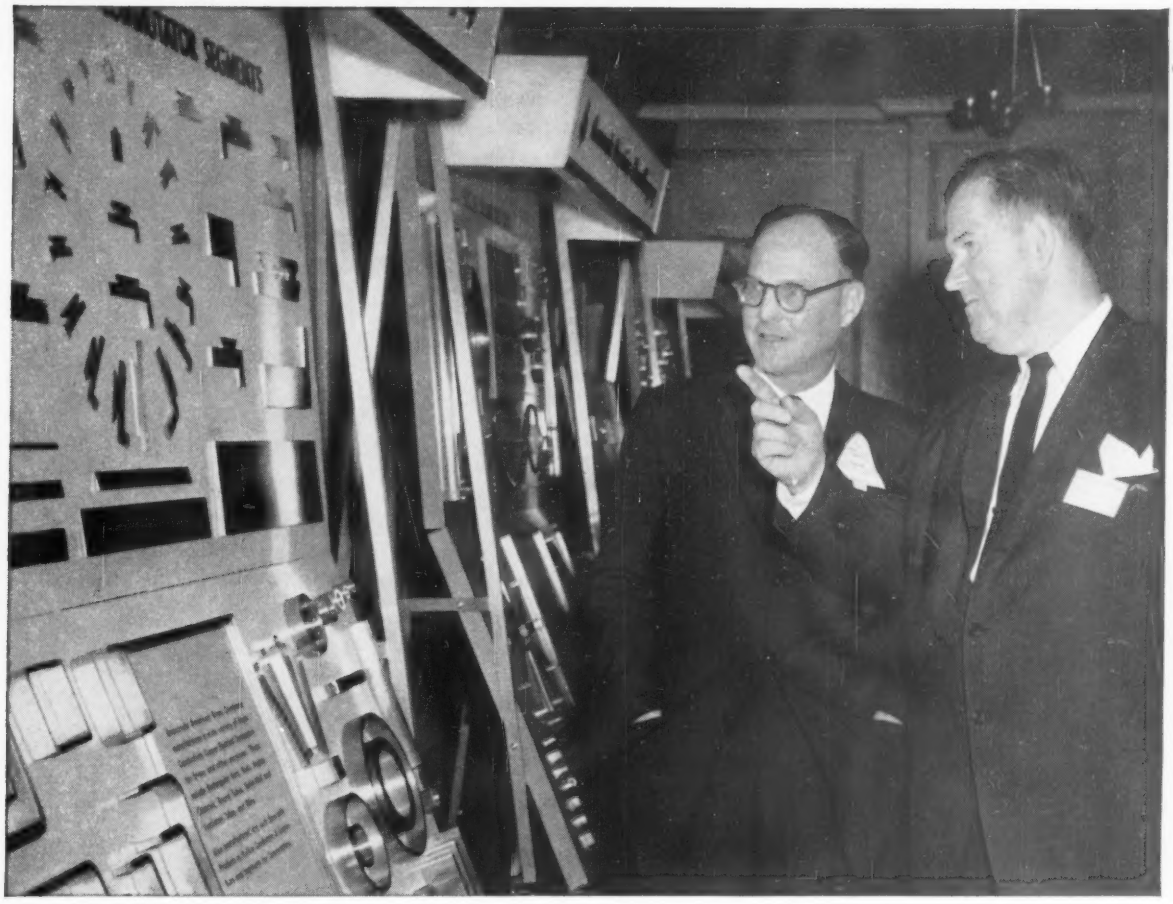
In addition, drive motor selection includes Fluid-Shaft, wound rotor slip ring, squirrel cage, crane hoist, and torque and dripproof or totally enclosed.

The units have been designed for use wherever machinery requires a low speed, high torque output.

Feeder Handles Powders

A DIE feeder called Force-Flo permits single operation tableting of dry blended powders when rotary presses are employed. The manufacturer claims wet mixing, drying, granulating, slugging, and other preparatory steps are eliminated.

Denser, high quality tablets with less pressure can be made since air entrapment, laminating, and capping are minimized, the feedermaker says. The unit can handle such



Anaconda takes to the road with ideas for greater values and higher productivity

We're in the market with ideas. Ideas for doing new jobs—like making transistor bases and fluid-cooled conductors. Ideas for doing present jobs better—helping you match the metal to the job more precisely so that you can offer equal or greater value *and* reduce total costs.

These ideas are embodied in Anaconda's line of copper, brass, and bronze mill products, the broadest in the industry—and in the vast pool of experience and technical knowledge of Anaconda men.

To put these ideas to work we've taken to the road with a traveling value-analysis clinic, stopping in industrial centers all over the country. We've a truckload of displays representing our principal products to serve as starting points for discussions of the ideas. We're detaching specialists, technical men, mill men, executives to discuss and explain the ideas with all manufacturers who can attend the clinics.

We're also busy generating new ideas in an aggressive research and development program. And we plan to make available soon small, balanced value-analysis teams to go out in the field and work with individual company organizations—make specific suggestions and recommendations regarding materials, fabricating methods, design, etc.

Anaconda is on the move. If you have problems in which you think a new approach might help—call your Anaconda American Brass representative. Or write: Anaconda American Brass Company, Waterbury 20, Conn.

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NICKEL SILVER MILL PRODUCTS

Anaconda American Brass Company

New weapon to fight

profit squeeze

Start profits on the upswing by wringing the water out of drilling, tapping, and milling costs. This new Natco Drilling-Tapping-Milling Machine—with Automatic Tool Changing and Natcotrol—is just the machine to do it.

Virtually eliminate jigs and fixtures, chop parts inventory, hold lead time to hours instead of weeks, cut your scrap rate to the vanishing point, know your costs in advance—these are the kind of savings available to you through Natcotrol—Natco's own fully electro-mechanical numerical control system.

Time wasted at the tool crib? Not any more with Natco's automatic tool changer that works without tool coding, and always holds the next tool ready for quick changing.

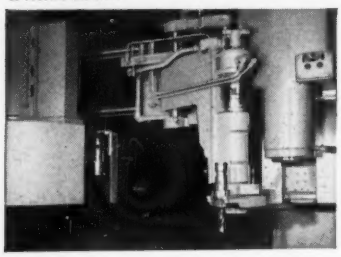
More reasons for putting Natcotrol and the Natco Automatic Tool Changer to work with Natco's powerful new Drilling-Tapping-Milling Machine, cutting your costs and widening your profit margin: Big work area, full numerical control of spindle depth and tool changing as well as table positioning, 50 - 3000 rpm, 2000 lb. thrust, 10 seconds tool changing time, 16" stroke, fast positioning, ±.001" accuracy.

Get us started on a quote for you today. There's a Natco representative in your territory ready to talk business. Write for bulletin No. 157-2.

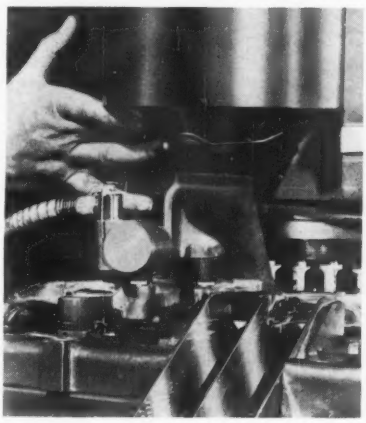
NATIONAL AUTOMATIC TOOL CO., INC.
Richmond, Indiana

NATCO

Changer arm rotates to bring new tool into position. While new tool is operating, tool presenter will index to receive old tool.



NEW PRODUCTS and equipment



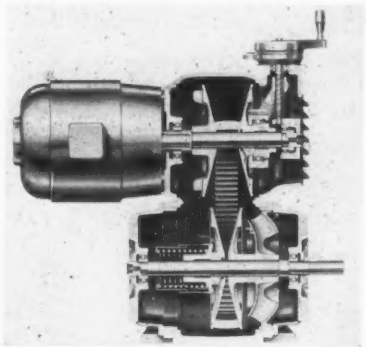
things as powdered metals, ceramics, chemicals, and pharmaceuticals.

For further information, *write* F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

Fan Cools, Saves Belt on Variable Speed Drives

THREE sizes of Vari-Master, variable speed drives are being offered by Western Gear. Horsepower ranges from 1 to 10 and the wide speed range goes up to 8:1.

Dripproof, totally enclosed, or explosion proof motors are available.



A fan on the variable speed shaft provides maximum cooling of the belt and extends its life. Discs are positioned by shaft shoulders to eliminate belt misalignment.

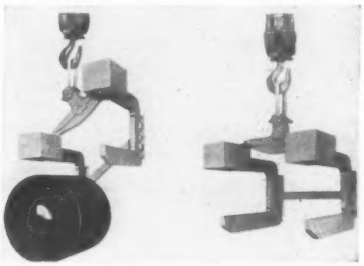
Bearings are double sealed and permanently lubricated. Shafts and keys are heavily chrome plated and ground to close tolerance. Discs have large grease reservoirs.

You can specify double, triple, or quadruple step reduction; any one of several assemblies (including horizontal and vertical); manual (handwheel), electric remote (pushbutton), or pneumatic automatic control. Several speed indicating tachometers are also available.

For further information, *write* Industrial Products Div., Western Gear Corp., Belmont, Calif.

Articulated Hook Lifts Two Coils at a Time

A DOUBLE ARM, articulated C hook allows a crane operator to give maximum service to a continuous coil line by picking off two coils at a time, yet permits the operator to handle or set down a single coil to fill all available floor



space. Waste of crane time for changing from a double to a single arm C hook is eliminated.

The empty arm elevates upward out of the way when only one coil is lifted, enabling the operator to spot a single coil in a narrow space without removing the double arm hook. When used on two coils, both are maintained in a level position.

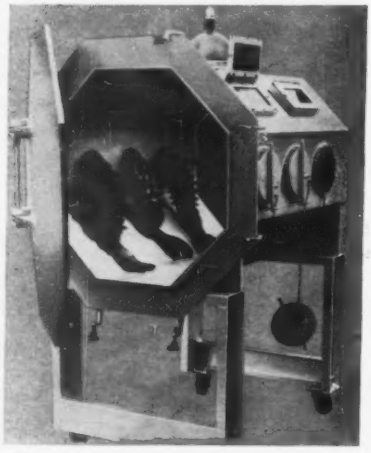
For further information, *write* Cullen-Friestedt Co., 1300 S. Kilbourn, Chicago 23, Ill.

Vacuum Dry Box Can Be Evacuated to 50 Microns

A PORTABLE vacuum dry box can be set up as a room for working with rare gas, inert atmosphere welding, poisonous substances, or with explosive and hazardous materials.

The unit can be evacuated to 50 microns with a leak rate of 1 micron per minute. Equipment includes Butyl gloves with low permeability,

NEW PRODUCTS and equipment



evacuable glove ports, air lock, fluorescent lamp, and welding or safety windows.

For further information, *write* Controlled Atmosphere Enclosures Mfg. Co., P. O. Box 3693, Jacksonville 6, Fla.

Life of Bearings in Canned Pump Extended

AUTOMATIC thrust balance design on the Series G Chempump is combined with larger bearings to give long bearing life. Motor life is reported to be greatly extended by an oil filled, stator cavity that dissipates heat from motor windings more effectively than was previously possible.

Advantages of the unit include longer, maintenance-free life. The company says it has practically eliminated the only two service points (bearing and motor windings) in the pump.

For further information, *write* Chempump Div., Fostoria Corp., Huntingdon Valley, Pa.

Forced Convection Controls Atmosphere Box Furnaces

FORCED convection maintains temperature uniformity in a line of controlled atmosphere, box furnaces. Smaller units operate at 2400° F; the larger ones at 2250° F. They can be heated by gas, oil, or electricity.

No alloy is used inside the furnace. The protected atmosphere is circulated by a ceramic fan. It can drive the atmosphere at 2500 cu ft per minute. Ceramic heating tubes are impervious to high carbon and high hydrogen atmospheres as well as being resistant to heating and cooling.

The units can be manually charged or they can be used with mechanized loaders and unloaders for production line heat treating operations.

For further information, *write* Ipsen Industries Inc., P. O. Box 500, Rockford, Ill.

Glass Fibers Go into Vibration Isolation Pad

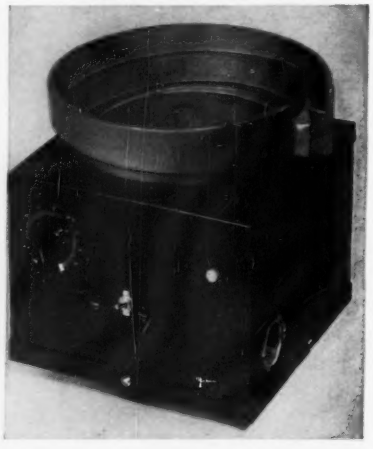
YOU don't have to lag machinery to the floor when installing a vibration isolation pad using processed, high density glass fibers. Pads are furnished in 18 x 18 x ½ in. sheets which are prescored at 2 in. intervals.

Savings up to 90 per cent in costs for installing or relocating machinery are possible, says the company.

For further information, *write* Consolidated Kinetics Corp., 1065 Dublin Rd., Columbus 12, Ohio.

Feeder Vibrates Parts, Keeping Line Oriented

ORIENTED position feeding of parts to automatic machines is a job for the Elk-O-Matic vibratory unit. A selective, variable control provides simple, accurate, nominal flow regulation.



The manufacturer says the unit can handle hard to flow parts. It eliminates production interruptions by keeping an oriented line of parts ready for discharge.

For further information, *write* Elk Engineering Works, St. Marys, Pa.

Firm Improves Qualities Of Its Bearing Steels

MODIFICATION of the standard, 440 C analysis, bearing steels offers improvements such as better hot hardness properties and better resistance to wear, corrosion, and oxidation, says Latrobe Steel. One modification, Lesco BG-41, is basically a replacement of 2 per cent chromium in the 440 C analysis with 4 per cent molybdenum. The other modifications, Lesco BG 42 and BG 43, consist of 1 per cent and 2 per cent vanadium with correspondingly higher carbon contents to the BG 41 analysis.

BG 41 is produced by air melting and by the vacuum, consumable electrode process. BG 42 and BG 43 are now air melted, but vacuum melting is also planned.

Heat treatment of the alloys develops the final Rockwell C 62-64 hardness. An oil quench, cold treating at 100° F, and double tempering at 950 to 1000° F are employed. An intermediate low temperature temper in the 300 to 400° F range may be used between the oil quench and the cold treatment to minimize the danger of thermal cracking. The added volume of vanadium carbide constituent in Lesco BG 42 and Lesco BG 43 provides improved wear resistance. Latrobe says the alloys could easily be considered stainless, high speed steels.

For further information, *write* Latrobe Steel Co., Latrobe, Pa.

231 lb Vibrator Develops 12 Tons Unbalanced Force

FREQUENCY of the DVSD-24,000 vibrator may be steplessly controlled from 0 to 3000 vpm by regulating the flow of air or oil. The 231

lb unit develops 12 tons of unbalanced force at 3000 rpm.

It can be equipped with pneumatic or hydraulic drive. The unbalanced force is generated by a lead shot loading which permits simple power adjustments by removing or adding shot to the eccentric weight.

For further information, *write* Martin Engineering Co., Neponset, Ill.

Magnetic Alloys Serve in Computer Memory Systems

HIGH purity is claimed for a line of magnetic alloys, Vapalloys, which can be used as source material to produce magnetic thin films for computer memories.

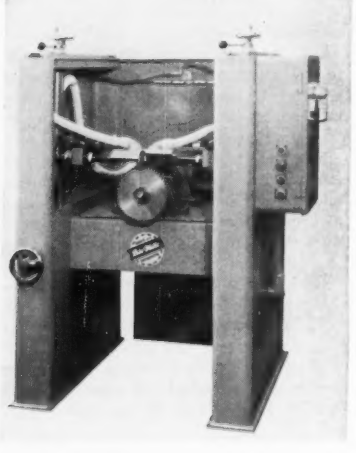
Materials are produced by vacuum, induction melting from iron, nickel, and cobalt. Vapalloys can be alloyed to any composition required for computer applications.

For further information, *write* Precision Metals & Electronics Div., Hamilton Watch Co., Lancaster, Pa.

Machine Deburrs Gears

STEEL, cast iron, and bronze gears can be deburred on the Model DB-20 and DB-30 machines. A floating grinding wheel spindle follows the contour of gear teeth.

Two floating arms permit both ends of the teeth to be deburred simultaneously. The operation is completed after one revolution. Housings over the grinding wheels serve as the intake for the exhaust system which makes it unnecessary



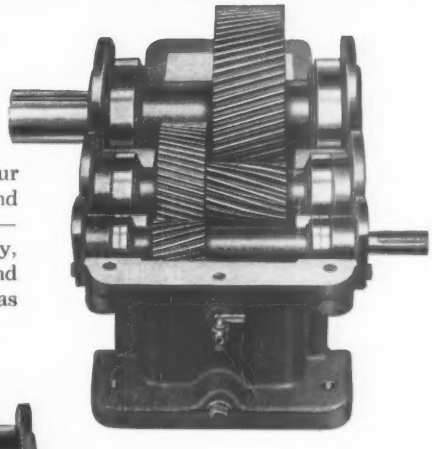
Fast Delivery on Custom Requirements

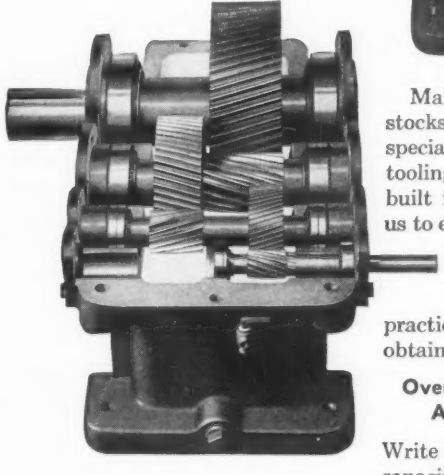
Specify H & S Helical Speed Reducers

Single · Double · Triple Reduction

You get *fast action* when you come to Horsburgh & Scott with your speed reducer and gearing problems.

We are able to meet your specifications—or design and build to your specific needs—products of highest quality, backed by the experience and reputation of many years as leaders in the gearing field.





Maintaining one of the largest stocks of patterns and blanks . . . special equipment and special tooling—much of it designed and built in our own plant—enables us to engineer and produce a wide range of custom gearing and transmission requirements, economically and practically as fast as you can obtain them from stock sources.

Overall design conforms to AGMA specifications

Write for details on wide size and capacity range of H&S Speed Reducers—Helical, Herringbone, Worm Gear and combinations.

H&S The HORSBURGH & SCOTT CO.

5112 Hamilton Avenue • Cleveland 14, Ohio

Specializing in fast production of quality Speed Reducers and Gearing to meet custom requirements.

to completely enclose the unit. It allows for free movements in work handling.

Features include a ¼ hp, variable speed, spindle drive; 5.74 rpm maximum spindle speeds (0.227 rpm minimum); 2-7/16 in. ID hollow spindle; and grinding wheel diameters to 3 in.

For further information, *write* Davis & Thompson Co., 4460 N. 124th St., Milwaukee 18, Wis.

Organic Inhibitor Checks Acid Attack

A HYDROCHLORIC acid inhibitor (Atcor HC) has been developed for pickling and acid cleaning applications. The material is reported to be an excellent film forming, organic inhibitor that normally minimizes the corrosion of ferrous surfaces by hydrochloric acid.

The major application is expected to be in the protection of mild and stainless steels. Other suggested applications: Inhibiting corrosion of other metals such as copper and high carbon cast steel.

For further information, *write* Dept. C, Atlas Powder Co., Wilmington 99, Del.

3 ft Chamber Produces Many Environments

HIGH and low temperatures, altitude, and humidity can be produced in a 3 cu ft environmental chamber. Temperatures from −100 to +500° F are accurately controlled to ±2° F. The unit has a thermal capacity of 1200 Btu/hr at −100° F, pulldown from ambient to −100° F in 60 minutes, and warm-up to 500° F in 60 minutes.

A 100,000 ft altitude can be attained in 30 minutes; 150,000 in 60 minutes. The units have a humidity range of 20 to 95 per cent ±5 per cent at temperatures between 35 and 200° F.

The 18 x 18 x 18 in. unobstructed chamber area is equipped with a recessed fin coil evaporator, adjustable shelves, pressurized amphenol fittings and interior illumination. The door measures 12 x 12 in.

For further information, *write* Cincinnati Sub Zero Products, 3932 Reading Rd., Cincinnati 29, Ohio.

Bearing Takeup Frames Listed in 11 Sizes

BEARING takeup frames made by Link-Belt are available in 11 sizes and are designed to accommodate babbitted, bronze, ball, roller and other bearing types in any two bolt, pillow block with mounting holes up to ⅝ in.

The frames (called Multi-Bearing) allow horizontal bearing adjustments from 6 to 24 in. and can mount 143 different bearingshaft sizes from ⅝ to 2-7/16 in. in diameter. Mounting pads are easily adjusted to the mounting holes in the pillow block. One pad is moved by an adjusting screw while the other pad slides freely to the proper distance between the pillow block mounting holes.

The mounting flexibility permits each size of takeup frame to accept the wide range of pillow block bore sizes.

Washers and nuts for mounting the blocks are furnished with each frame. Strong channels on the steel frame provide rigidity. Channels also protect the adjusting screw and provide easy access for lubrication and cleaning.

For further information, *write* Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

NEW Literature

Write directly to the company for a copy

Chromium Alloy Die Steel

Characteristics and typical applications of Trimmax, a chromium alloy die steel, are contained in Data Sheet 12. It can be applied in both hot and cold work. Heppenstall Co., 4620 Hatfield St., Pittsburgh 1, Pa.

Power Source Data

"Specialized Power" describes construction and application of specialized direct and alternating current power supplies. Silicon, selenium, and germanium rectifier devices are pictured. A. O. Smith Corp., Elkhorn, Wis.

Distribution Equipment

Complete buying information on low-voltage distribution equipment is covered in a 92 page catalog (GEC-1100C). Product selector charts, descriptions, consolidated pricing tables, and a catalog number index are given. Distribution Unit, General Electric Co., Plainville, Conn.

Timing Belt Catalog

Timing belt drives for mechanical power transmission are available for load capacities from fractional horsepower up to 600 hp for belt speeds up to 16,000 fpm. All the information needed to select the proper drive, using a minimum of arithmetic, is given in an 80 page catalog, No. 19103. T. B. Wood's Sons Co., Chambersburg, Pa.

NEW BOOK

Top Management Handbook, edited by H. B. Maynard, McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y., 1248 pages, $17.50

Sixty top executives present their thinking on management fundamentals. They define the function of management, from the point of view of the chief executive and of the head of each activity. Covered are such elements as the task of managing; gathering information; directing, guiding, and leading; evaluating and measuring results; promoting innovation; managing research and development; managing marketing; building and retaining executives. Among the contributors: Thomas Watson Jr., president of IBM Corp.; Herman W. Steinkraus, chairman, Bridgeport Brass Co.; Carter Higgins, president, Worcester Pressed Steel Co.; Rudolph F. Bannow, president, Bridgeport Machines Inc.; Milton Lightner, chairman, Singer Mfg. Co.; Adm. Ben Moreell, retired chairman, Jones & Laughlin Steel Corp.; David Rockefeller, vice chairman, Chase Manhattan Bank; and W. F. Rockwell Jr., president, Rockwell Mfg. Co.

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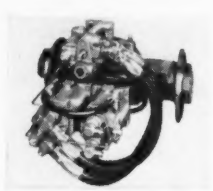
Your immediate attack against rising costs



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Hot Rolled Sheets	Alloy Sheets and Plates	Electric Weld Line Pipe
Hot Rolled Pickled Sheets		Spiral Welded Pipe

Mills Hopeful for February

STEELMAKERS ARE HOPING to maintain their January pace in February.

January's output was about 6.5 million ingot tons—up 12 per cent from December's 5.8 million and the highest since October's 6.9 million. This week's production will be close to the 1.5 million tons that STEEL estimates the industry produced in the week ended Jan. 28. Last week's output was 1.7 per cent higher than the 1,499,000 tons poured in the week ended Jan. 21.

TEMPORARY PLATEAU— There's not much likelihood that February with fewer days will be better than January. Steelmakers would have to up their daily production and shipments slightly just to equal January's figures. Orders are showing no over-all improvement. At some mills, they're running a little behind last month's. But it's too early to tell what the outcome will be. Orders placed after Feb. 1 may be large enough to push the month's volume up to the January level. Some steelmakers have been getting 40 to 50 per cent of a month's business after the first of the month.

AUTO CUTBACKS HURT— Production cutbacks in the automotive industry are largely responsible for the sidewise movement in steel. If it weren't for automakers' requests that part of their February tonnage be held until March, the market trend would be moderately upward. Reasons: 1. Other consumers of sheets and bars are stepping up their purchases as they complete their inventory adjustments. 2. Demand for such products as tin plate, oil country goods, and line pipe is firming appreciably.

BUT WORST IS OVER— The automotive setbacks aren't expanding in number or tonnage. To that extent, the situation is encouraging. What's more, some buyers are making adjustments that will increase rather than reduce the tonnage they will take. Reason: Inventories are getting too low in some sizes. Unless new car sales drop sharply, automakers can be expected to at least hold their output at the current level. Their January production (about 425,000 cars) was only slightly in excess of sales, so there wasn't much of an addition to dealer inventories. Look for production of 430,000 cars in February and 500,000 in March. First quarter output: About 1.35 million (vs 1.7 million in last year's fourth quarter). With labor negotiations and a possible strike threat coming up in motordom this summer, you can expect automakers to: 1. Try to finish their 1961 model runs early. 2. Build enough cars in the second quarter to keep dealer inventories close to the 1 million car level.

OUTLOOK FOR THE YEAR— What's ahead? Here are some appraisals by government and industry officials:

- Business & Defense Services Administration—Ingot output will be about the same as last year's. Higher steel consumption by the construction, container, appliance, and export sectors of the economy. Lower consumption by automakers, metalworking equipment manufacturers, railroads, and the oil and gas industry.
- Avery C. Adams, chairman, Jones & Laughlin Steel Corp.—"I would expect the first quarter to be better than the fourth quarter of 1960 . . . We are in a short term recession but we will pull out of it by July."
- Joseph L. Block, chairman, Inland Steel Co.—First half steel demand should exceed second half, 1960, demand by about 10 per cent. "There should be some price increases to compensate for the impact of the wage and benefit increases involved in the current labor contract."

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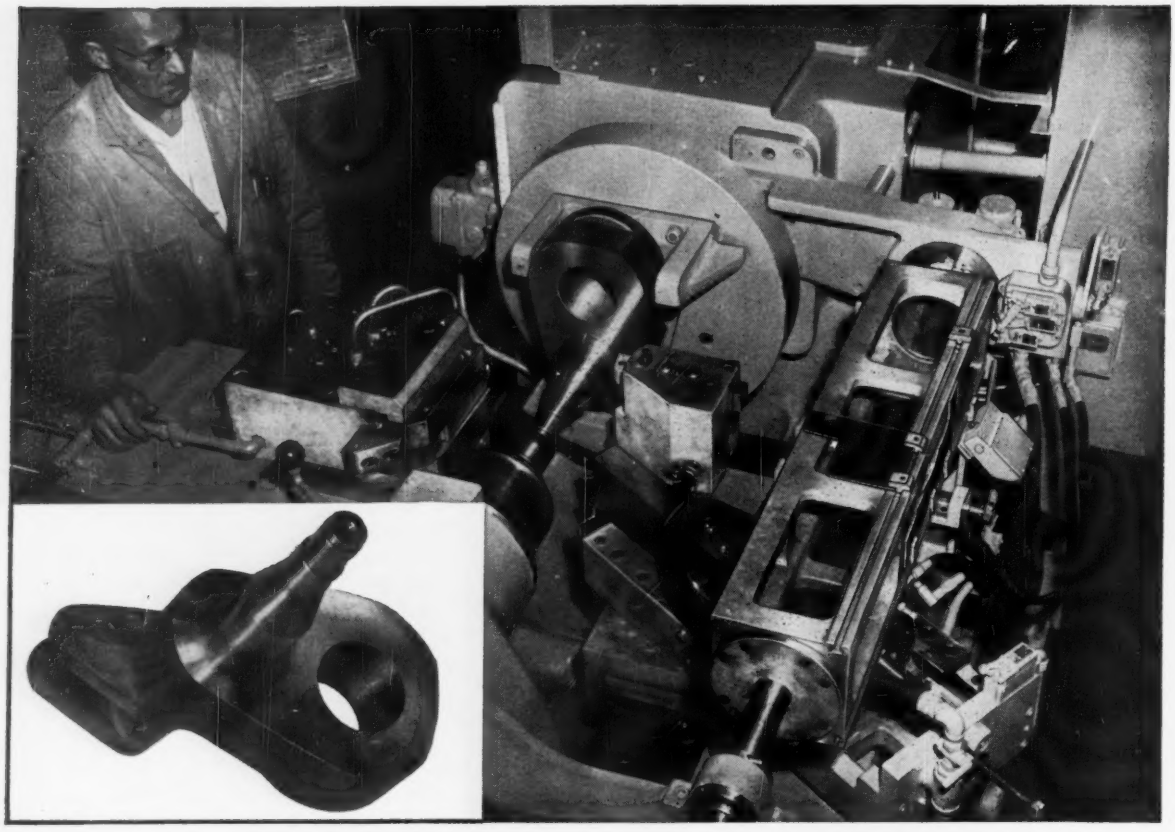
*Current prices were published in the Jan. 23 issue and will appear in subsequent issues.



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Here's how this producer is holding floor-to-floor time on military tank idler arm forgings—18″ long with 5½″ major radius—to just 21.1 minutes.

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For complete details on the No. 24 and other Gisholt machines, call your Gisholt Representative today. He has the facts, and his wide experience may point the way to more profitable production in your plant.

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Line Pipe Demand to Rise in 1961

PIPELINE construction in 1961 will be a potent force in pulling metalworking and the economy out of the recession. For the first time in many months, nearly every factor affecting markets for line pipe, pumps, valves, fittings, and other auxiliary pumping equipment is on the plus side.

1. Authorizations for natural gas pipeline projects in fiscal 1960 (ended June 30) set an all-time record. They will affect pipeline construction well into 1961. (See graph, Page 130.)

2. The authorization roadblock in the Federal Power Commission has been broken. Result: Near record authorizations in the last six months of calendar 1960.

3. Surveys in the pipeline industry indicate that projects held up by the FPC last year have not been canceled, merely postponed. Presumably, approval will come this year.

4. A special STEEL survey of 49 major pipeline companies indicates they plan to lay nearly 7 per cent more miles of crude, product, and natural gas pipelines in 1961 than they did in 1960. (Reportedly, financing is not a major problem.)

5. The biggest increase by size of pipe will be in the larger diameters —indicating gains in mileage and mill tonnage.

6. Imports of pipe and tubing are significantly below the levels in early 1960 and late 1959.

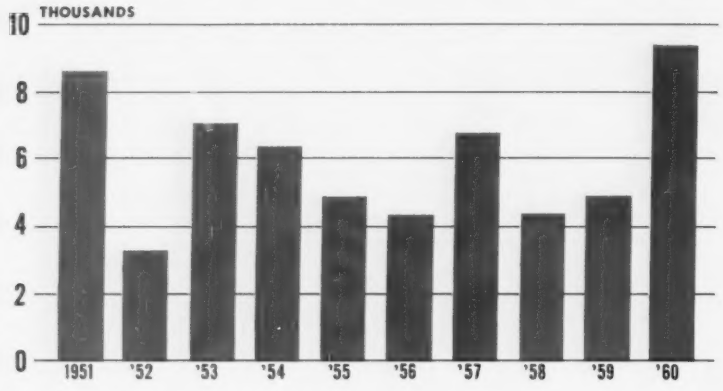
● **Inventories Still Problem**—The biggest continuing problem: Heavy inventories of line pipe. STEEL asked the pipeline companies what portion of their 1961 requirements were already ordered or on hand at the turn of the year. The answer: Nearly 30 per cent. Even at that, their stocks are lower now than they were all year, indicating that their steel mill order activity will quicken. Since the companies say that they plan to place orders for the bulk of their 1961 requirements in the first half, the pickup should not be far away. (Some steelmakers tell STEEL it is already being felt.)

● **Records Coming** — The natural gas industry, which accounts for the bulk of pipeline activity, is in the middle of the greatest expansion period in its history, declares the American Gas Association. While 1960 did not come up to expectations, it was no reflection of any basic change in the industry's plans. In fact, last year's record outlay of about $1,890 million was only $343 million shy of the original goal—and most of that will be made up this year, resulting in total spending just over $2.2 billion for new facilities.

AGA reports that the $6,182 million the industry will invest in 1960-62 will be about 21 per cent higher than the expenditures in the 1957-59 period. The pipeline ex-

RECORD APPROVALS BOOST PIPE OUTLOOK

(Total miles of natural gas transmission lines, fiscal year ended June 30)



Source: Federal Power Commission.

pansion portion ($2,746 million) will exceed that of the earlier period by 27 per cent.

The shifting of programs from 1960 to 1961, explains AGA, "is attributed primarily to . . . the regulatory lag in obtaining certification for new projects." But a recent survey shows that no major program originally scheduled for 1960 was canceled.

At the beginning of this month, the FPC still had 186 applications pending for projects involving 5783 miles of transmission lines. In the last six months, the agency has been receiving new applications at the rate of 21 a month and issuing authorizations at a rate of 20 a month, indicating that pipe demand will remain high for some time.

Chief interest is centered on large diameter transmission lines, but smaller pipe will also be needed in increasing amounts for distribution lines. AGA reports that such expenditures in the 1960-62 period will climb to $2,149 million from $1,777 million in the preceding three years.

• **Oil Lines in Step**—While plans of crude and product pipeline companies are harder to pin down than those of the gas industry (the companies do not apply for government authorization prior to construction), the 30 companies responding to STEEL's questionnaire report that they plan to lay 1411 miles of pipe this year vs. 1262 in 1960. The heaviest demand for pipe will be in 2 to 6 in. sizes, but it is important to note that the greatest increase this year will be in the 6 to 16 in. sizes. So tonnage requirements should show an even greater rise than mileage.

(In gas pipe, biggest gains will be in diameters 30 in. and over.)

• **Big Plus**—There are fewer long distance transmission lines listed as certainties now. (Last year, an 1800 mile line and a 600 mile line accounted for the major gains.) But some are in the planning stage, which could keep pipe mills busy in the second half. Last December, Southern California Edison Co. filed an application with the FPC for a 1600 mile pipeline to export natural gas from Texas into Mexico and to import gas from Mexico into California.

In addition, one (maybe two) major liquefied petroleum gas (LPG) line will be built this year. Southern Pipe Line Corp., a subsidiary of Transcontinental Gas Pipe Line Corp., Houston, is making river crossings for its 1355 mile line from Houston to Danville, Va. Work on the main line is expected to start by Apr. 1, with completion scheduled by August, a company spokesman told STEEL. Pipe for the line has been ordered (none was in inventory) for delivery throughout the four month period.

A second LPG line following almost the same route is under consideration by a rival group. It would involve 1100 miles of pipe and terminate at Raleigh, N. C.

Tin Can Shipments Off Sharply in November

The movement of tin plate cans dropped sharply in November (1960) to 317,940 tons, from 416,-296 in October, reports the U. S. Census Bureau. It compared with shipments of 297,681 tons in November, 1959. The total for the first 11 months of 1960 was 4,455,-771 ton vs. 4,632,034 in the same 1959 period.

Shipments of aluminum cans in November amounted to 1468 tons, against 1504 in October. The total for the first 11 months of 1960 was 17,743 tons.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 135 & 136

Despite automotive industry setbacks, sheet steel is moving at a somewhat faster pace than it was a month ago, mostly small tonnage for diversified spot needs.

Improvement is reported at virtually all production points, but volume is disappointing, and mill deliveries show no sign of stiffening. Hot rolled sheets are being offered for shipment in two to three weeks, cold rolled in two to four, galvanized in two to three, and such specialties as electrical sheets and enameling stock in three weeks.

Steel Bars . . .

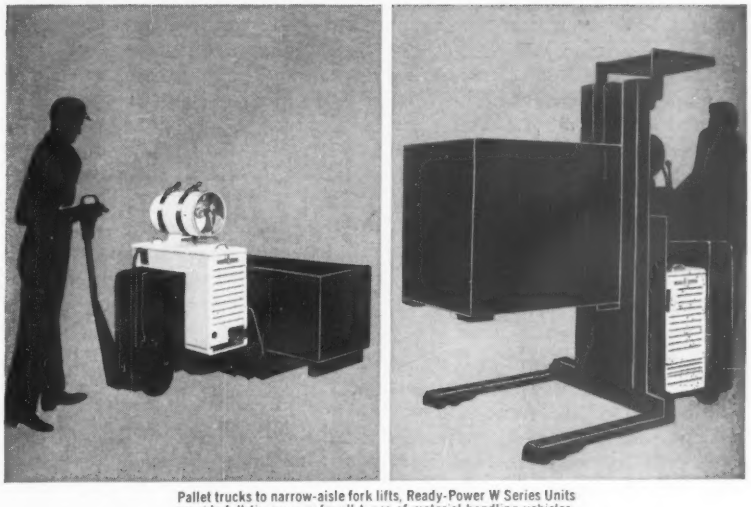
Bar Prices, Page 134

While there's a fair diversity of hot carbon bar demand, orders reflect only small improvement in over-all volume. Service center operators are specifying lightly, and the same is true of cold finished converters and the railroads. New orders, in a general way, are a shade better than they were, but volume continues disappointing, due primarily to setbacks in automotive requirements.

Tubular Goods . . .

Tubular Goods Prices, Page 140

Several pipemakers report a noticeable pickup in ordering the last couple of weeks. Last week, a producer at Birmingham was in receipt of several orders for gas line pipe. His January orders are well ahead of those last month. A Pittsburgh area producer expects his



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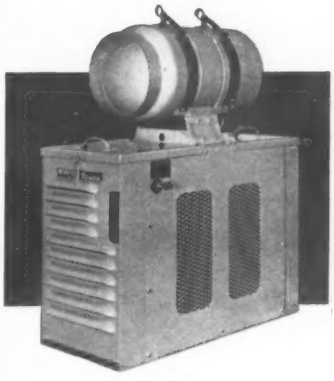

Ready-Power W Series Units are designed to fit practically any make of electric walkie and small rider-type trucks. The compact units are easily installed or interchanged. A new 12 volt automotive-type starting and ignition system assures quick starts. Top cover and end plate are easily removed for quick accessibility to engine and controls. The unit can be equipped with either gasoline or LP-Gas fueling systems.

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January bookings will at least equal those in December which was his best month since early last year.

Babcock & Wilcox Co. has announced a new pricing system for pipe weldings, fittings, and flanges, which lowers prices on large orders. The move seeks to encourage pipe distributors to maintain larger inventories.

Wire . . .

Wire Prices, Pages 136 & 139

Wiremakers are anticipating a pickup in ordering before the end of this quarter. Current mill operations are restricted, reflecting small order backlogs. In New England, wire mill operations (including converters) declined 35 to 40 per cent of capacity this month. Practically all the larger consuming industries curtailed orders for drawn wire and rods.

Plates . . .

Plate Prices, Page 134

Demand for sheared plates has eased off again. An Eastern producer reports a drop of 15 per cent in bookings. Also, there's some lag in the plate specialties, although inquiry continues active in that market area, particularly for heads, flange work, and alloy material. Requirements for the chemical industry appear strongest.

The mills anticipate little pickup in ordering before March when structural requirements are likely to expand seasonally. Also, shipwork and railroad needs are expected to increase.

Ingot Output Steadies At 1.5 Million Ton Mark

Steelmaking operations apparently have reached a plateau of about 1.5 million tons. STEEL's estimate for the week ended Jan. 21 represents a gain of about 0.1 per cent over the previous week's actual output. Reports to STEEL indicate there'll be little change this week.

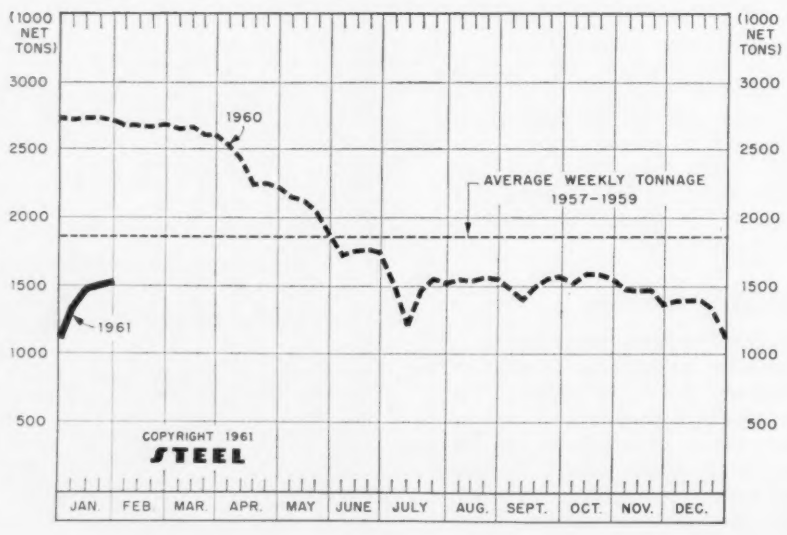
- **Pittsburgh**—Production is holding at an index figure of 70 (based on average output for 1957-59). On the old basis of Jan. 1, 1960 capacity, the district rate would be about 47 per cent.
- **Los Angeles**—Mills increased output to the levels prevailing in late November and early December. On the old basis, that would be about 55 per cent of capacity.
- **Youngstown**—Steelmaking operations here eased slightly last week following a rise to an index figure of 76 for the preceding week.
- **Philadelphia**—Ingot production in this district is the third largest in the nation, exceeded only by the Chicago and Pittsburgh districts. Despite severe weather conditions, January steelmaking operations will surpass those of December.
- **Birmingham** — Steelmaking rate for the Southern district rose to an estimated 62 per cent of capacity (old basis). That equals the high since mid-July of last year.
- **Buffalo** — Steel ingot output is holding steady here at an index figure of 73. A major producer lighted one additional open hearth, but that was nullified by the shutdown of a furnace by one of the smaller producers.
- **Chicago** — Estimated operations last week were at the equivalent of 54 per cent of 1960 capacity, down 1 point from the previous week.
- **Detroit**—Unless orders pick up, steelmakers expect to reduce operations in February from the relatively high level that was maintained in the month just ending.
- **Cleveland**—Indications are there'll be little change in operations in this district the next several weeks, despite setbacks in auto requirements. Last week's estimated average output of around 71,000 tons for the district duplicated that of the preceding week. On the basis of 1960 district capacity, that's equal to 46 per cent of capacity operations.
- **Cincinnati**—Steel producers here are hopeful that users other than automakers can pick up the slack in consumption. Production in the week ended Jan. 21 was about 65,500 tons and was slated to rise to 66,500 tons for last week.

STEEL INGOT PRODUCTION

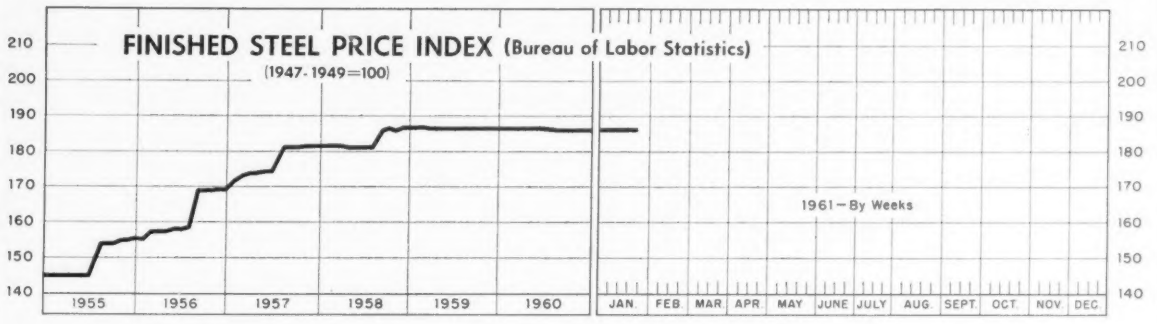
Weeks Ended	Net Tons	Change
Jan. 28	1,500,000	+0.1%
Jan. 21	1,499,000	+1.1%
Jan. 14	1,482,000	+8.9%
Totals to Date		
1961	4,342,000	−46.8%
1960	8,169,000	

DISTRICTS	Week Ended Jan. 21 Tons	Week Ended Jan. 21 Index†	Week Ended Jan. 14 Index†
Northeastern	219,100	82	83
Buffalo	71,000	73	68
Pittsburgh	282,400	70	70
Youngstown	129,000	76	73
Cleveland	71,000	77	77
Detroit	107,000	102	99
Chicago	325,000	87	86
Cincinnati	65,500	87	76
St. Louis	44,500	85	78
Southern	86,600	80	80
Western	98,000	84	90
Industry	1,499,000	80.5	79.6

*Estimated by Steel. †1957-59=100.



Price Indexes and Composites



Jan. 24, 1961	Week Ago	Month Ago	Jan. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.8**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Jan. 24

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Jan. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.00
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	32.00	32.00*	29.33	42.33	51.50

*Revised.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Jan. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{1}{2}$-$\frac{5}{8}$" Pitts.	6.40	6.40	6.40	6.40	5.025-5.375

PIG IRON, Gross Ton

	Jan. 25 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	205.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$29.50	$29.50	$26.50	$42.50	$50.50
No. 1 Heavy Melt, E. Pa.	36.00	36.00	35.00	42.00	55.00
No. 1 Heavy Melt, Chicago	30.50	30.50	26.50	42.50	49.00
No. 1 Heavy Melt, Valley	32.50	32.50	26.50	44.50	54.50
No. 1 Heavy Melt, Cleve.	28.50	28.50	23.50	43.50	52.00
No. 1 Heavy Melt, Buffalo	27.50	27.50	23.50	37.50	47.50
Rails, Rerolling, Chicago	54.50	54.50	48.50	63.50	67.50
No. 1 Cast, Chicago	39.50	39.50	37.50	55.50	49.50

COKE, Net Ton

Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, Jan. 25, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 135; footnotes, page 139.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 .....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2. .119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 .....119.00
Warren, O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'e'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 .....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded
(Including leaded extra)
Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon
(Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 .....9.225
S.Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 .....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ....9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill. G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Longe Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 ....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 .....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 ....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ..15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria,O. S1	...	...	19.05	22.15	....
FranklinPark,Ill. T6	...	...	19.20	23.30	28.15
Harrison,N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer,Mass. W12	...	...	18.85	....	....
Trenton,N.J. R5	...	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ..7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 ....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 ....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	18.10	19.70	20.20	20.70	15.70††	
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ...8.95
SparrowsPoint,Md. B2...8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2..12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16...9.75
NewHaven,Conn. A7 ...10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass. A7,J4,T6 10.05

WIRE, MB Spring, High-Carbon

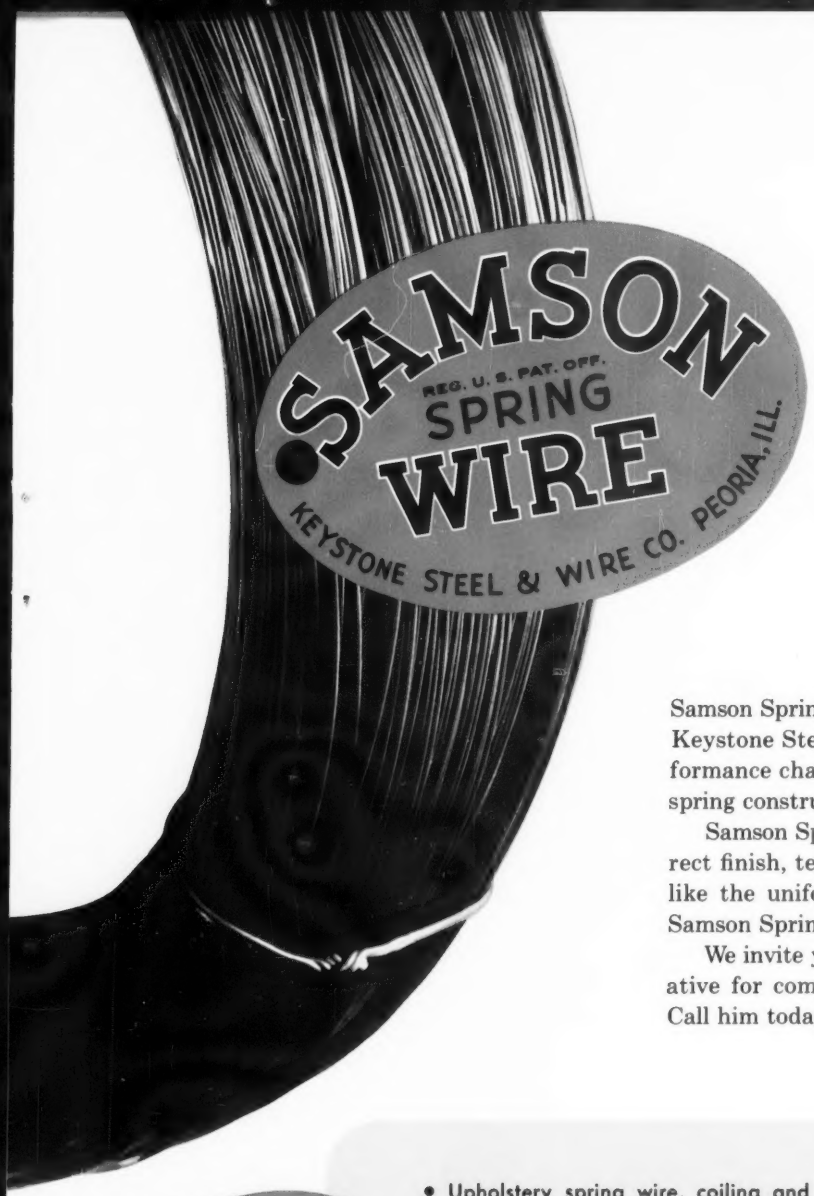
Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 ....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7, J6.16.60

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.



. . . meets every spring construction requirement

Samson Spring Wire—an up-to-the-minute product of Keystone Steel & Wire Company, with modern performance characteristics—is available to fulfill every spring construction.

Samson Spring Wire is custom made with the correct finish, temper and tensile to fit each use. Users like the uniform size and coiling characteristics of Samson Spring Wire.

We invite you to contact your Keystone representative for complete details on Samson Spring Wire. Call him today—or write direct.

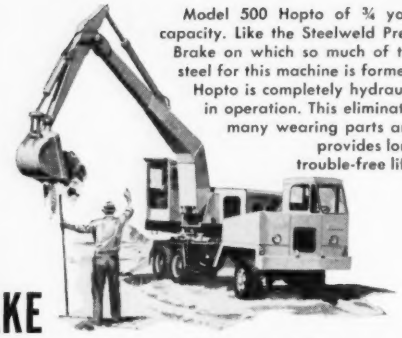
name your need . . .

- Upholstery spring wire, coiling and knotting quality
- Upholstery spring wire for marshall pack units
- Special upholstery spring wire for use in automatic coiling and knotting machines
- Common lacing wire
- Special automatic lacing wire
- Spring wire for cross helical springs and for short tension springs
- High carbon wire for borders and braces
- High carbon wire for cold rolling into border and brace sections
- Wire for severe crimping or clinching upholstery spring construction

Keystone Steel & Wire Company
Peoria 7, Illinois

KEYSTONE
WIRE FOR INDUSTRY

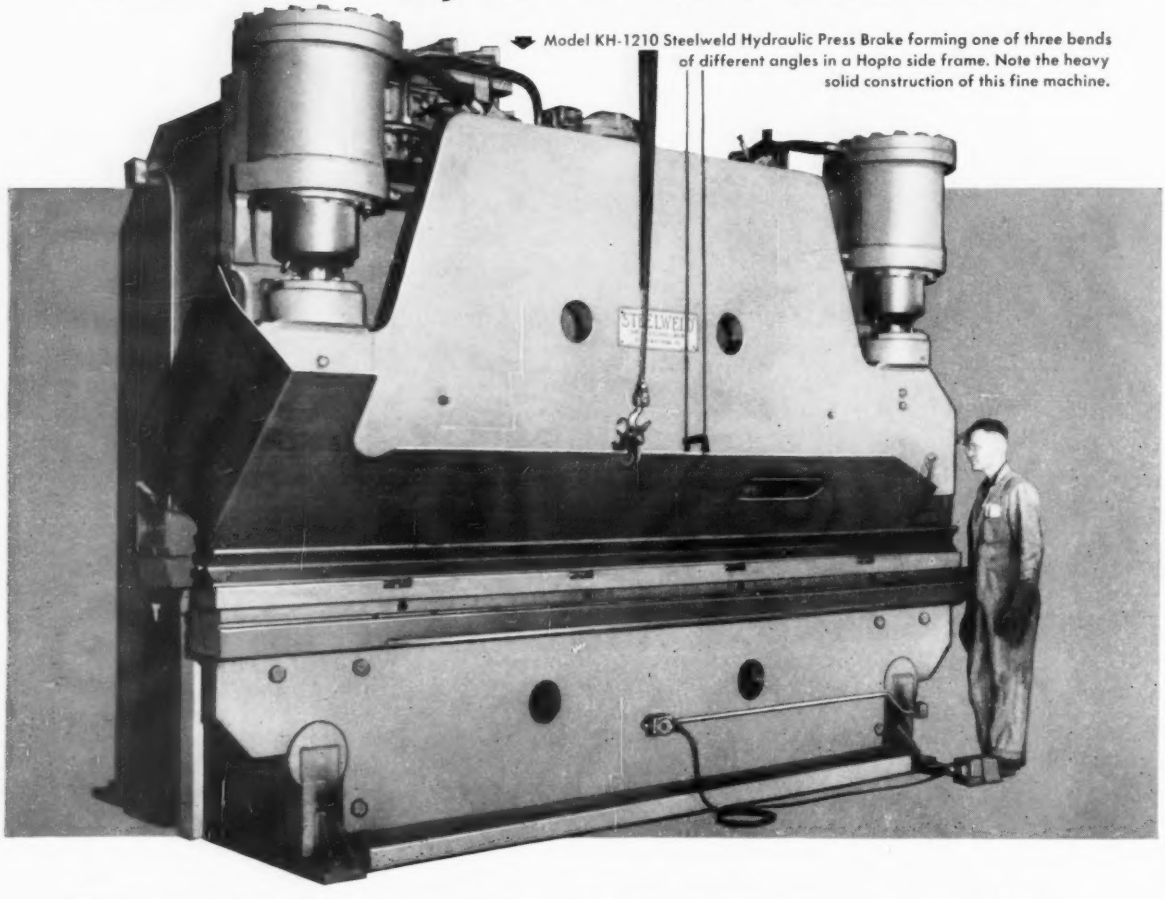
Practically all bends in the steel in these booms for Model 500 Hoptos were produced on the press brake below.



Model 500 Hopto of ¾ yard capacity. Like the Steelweld Press Brake on which so much of the steel for this machine is formed, Hopto is completely hydraulic in operation. This eliminates many wearing parts and provides long trouble-free life.

STEELWELD HYDRAULIC PRESS BRAKE Forms 90% Of Heavy Plate Bends For Hopto Backhoes

Model KH-1210 Steelweld Hydraulic Press Brake forming one of three bends of different angles in a Hopto side frame. Note the heavy solid construction of this fine machine.



A 400 ton Steelweld Hydraulic Press Brake is a key machine in the production of Hopto Backhoes at The Warner & Swasey Company, Badger Division, Winona, Minnesota. 90% of the many bends on various thickness plates required in the Hopto construction are made on the Steelweld machine.

The press brake has speeded production enormously because bends of different degrees can be made quickly and repeatedly on a simple set of four-way dies by presetting a ram adjustment. This determines the length of ram travel and makes possible changing the setting from one angle to another in about the time required to snap one's fingers.

The machine delivers accurate bends to close tolerances. It is easy and safe to operate. Although it is practically always in use, no time is lost for servicing. It has proven to be a big help in lowering production costs.

Write for free booklet No. 2024

STEELWELD
MECHANICAL and HYDRAULIC
PRESS BRAKES

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7879 E. 281 ST. • WICKLIFFE, OHIO

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt. Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt., Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.193••
Aliquippa,Pa. J5	.190§
Atlanta A11	.197•
Bartonville,Ill. K4	.199
Crawfordsville,Ind. M8	.198
Donora,Pa. A7	.193†
Duluth A7	.193†
Fairfield,Ala. T2	.193†
Houston S5	.198••
Jacksonville,,Fla. M8	.198
Johnstown,Pa. B2	.196§
Joliet,Ill. A7	.193†
KansasCity,Mo. S5	.198••
Kokomo,Ind. C16	.195†
Minnequa,Colo. C10	.198••
Monessen,Pa. P7	.196§
Pittsburg,Calif. C11	.213†
Rankin,Pa. A7	.193†
S.Chicago,Ill. R2	.193••
SparrowsPoint,Md. B2	.198§
Sterling,Ill.(7) N15	.198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40••
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65••
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65••
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75••
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City, Ala. R2	187••
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191•
Bartonvill,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192••
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192••
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192••
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187••
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55••
Aliquippa J5	8.65	9.325§
Atlanta (48) A11	9.00	9.75•
Bartonville(48)K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55••
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80••
Jack'ville,Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80••
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80••
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55••
S.SanFran. C10	9.95	10.50••
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: •13.50c. †5c. ‡10c. ‡‡Less than 10c. ††10.50c. ‡‡11.00c. ••Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
•Bulk	50

•Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use apilcable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:
¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ⅛ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 3 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 12.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	...	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
414	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: 5%	Plates: Carbon Base 10%	Plates: Carbon Base 15%	Plates: Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago R2	66.00	66.50	66.50	67.00
S.Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	...	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte.Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb pigiets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	9.22	10.20	10.70	52.00	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	8.74	10.26	10.20	55.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	9.48	10.46	11.05	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	9.36	10.34	10.84	....	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.00	16.30	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	9.42	10.58	11.08	....	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅜ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ⅛ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
- Carbon (N.T.):
  - Forging $97.00
  - Rerolling 78.00
- Alloy (N.T.) 115.00

Wire Rods:
- Carbon 5.70
- Alloy 6.40

Wire (carload lots):
- Merchant annealed . 8.40
- Low carbon indus. . 7.20
- Upholstery spring .. 8.55
- M.B. spring 8.85

Bars & Small Shapes:
- Carbon, merchant .. 5.30
- Carbon, special 5.85
- Alloy 6.40

Bar Mill Bands:
- Carbon 5.40
- Alloy 8.05

Bars, Reinforcing 5.30

Structural Shapes:
- Standard carbon ... 5.50
- Angles & zees 5.40

Plates, Carbon:
- Sheared 5.45
- Universal mill 5.10

Sheets & Coils, Hot Rolled:
- Carbon sheet 4.95
- Carbon strip 5.00

Sheets & Coils, Cold Rolled:
- Carbon sheet 6.35
- Carbon strip:
  - (0.080 and lighter) 6.35
  - (0.081 and heavier) 6.65

Sheets & Coils, Galvanized:
- Standard quality ... 6.70
- Culvert quality 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
- Field grade 9.00
- Armature grade 9.50
- Electrical grade ... 10.15

Sheet Piling 6.15
Skelp 4.70
Rails, Heavy 5.55
Rails, Light 5.70
Joint Bars 6.55
Tie Plates 6.35
Grinding Balls (3 in. diam.) 7.00
Tin Mill Products (Per base box; 100 lb base wt)
- Coke tin plate (1.25 lb pot yield) $10.60
- Electrolytic tin plate (0.25 lb coating). 9.10
- Black plate 8.30

Nails, Wholesale:
- Carload lots .....Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe..36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ..	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.50
Bronze powder, 90/10.	55.10
Copper, all types 15.25*	
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types ..0.78-1.06	
Nickel-Silver	58.70
Solder	7.50*
Stainless Steel, 304 ..	89.00
Stainless Steel, 316 ..	$1.07
Steel, AISI 4650	32.00
Tin 14.00*	
Zinc	24.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh ..	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten .....nom.	
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	*$5.65*	*$5.90*	*$5.60*	*$5.50*	*$5.80*
Bar Size Angles	*5.85*	*6.10*	*5.80*	*5.70*	*6.00*
Structural Angles	*5.65*	*5.90*	*5.60*	*5.50*	*5.80*
I-Beams	*5.60*	*5.85*	*5.55*	*5.45*	*5.75*
Channels	*5.60*	*5.85*	*5.55*	*5.45*	*5.75*
Plates (basic bessemer)	*5.45*	*5.80*	*5.50*	*5.40*	*5.70*
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.50	6.40	6.40	6.25	6.60
Merchant Bars	*5.85*	*6.10*	*5.80*	*5.70*	*6.00*
Hot-Rolled Bands	*5.95*	*6.20*	*5.90*	*5.80*	*6.10*
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O. H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (§)	*6.55*	*6.80*	*6.50*	*6.40*	*6.70*

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

- Mesabi bessemer $11.60
- Lump ½ in. and up 12.85
- Fines, under ½ in. 10.72
- Mesabi nonbessemer 11.45
- Old Range bessemer 11.85
- Old Range nonbessemer 11.70
- Open-hearth lump 12.70
- High phos. 11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 25.00†
Chilean, 62-65%, c.i.f. Atlantic ports .. 22.00
Brazillian, 68.5% f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $19.00-19.50*
Domestic, concentrates, f.o.b. milling points 22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 .....$34.00-35.00†
48% no ratio .....25.00-26.00†

South African Transvaal

44% no ratio 18.75
48% no ratio .....24.00-26.00†

Turkish

48% 3:1 .....35.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60% $2.70-3.20
60-65% 3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace $14.75-15.25
Connellsville, Pa., foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 34.05
Saginaw, Mich., deld. 35.63
Erie, Pa., ovens 32.00
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.64
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens. 30.75
New Haven, Conn., ovens 31.00
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.45
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.78
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 34.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75
Per ton bulk, f.o.b. cars or trucks, plant.
Ammonium sulfate, regular grade $32.00

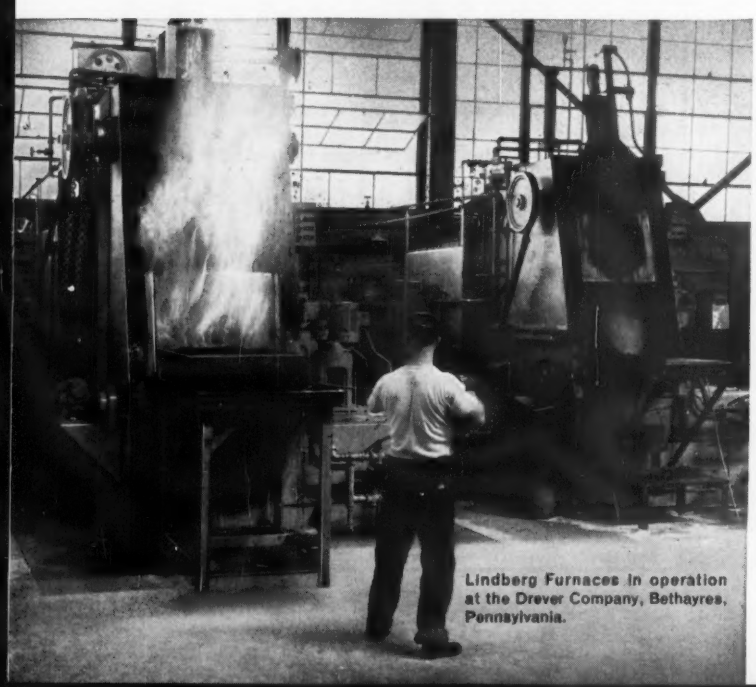
What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

DREVER COMPANY



Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry

Scrap Rise Awaits Steel Pickup

Recent show of market strength is short-lived, reflecting failure of steel production to stage sharp upswing. STEEL's composite on No. 1 heavy melting is unchanged at $32

Scrap Prices, Page 148

• **Pittsburgh**—Trading is negligible, and prices are unchanged. It's uncertain whether prices on the new industrial lists at monthend will be up or down, but observers concur that the buying will be purely speculative.

• **Philadelphia**—With yard collections hampered by bad weather, and with continued strong demand from abroad, scrap prices continue to show strength. Couplers, springs, and wheels are higher at $41, delivered, and rail crops (2 ft and under) are up at $48-$50. Domestic buying is off from what it was a couple weeks back.

• **Chicago**—The absence of zip in steel demand has halted the upward pressure on scrap prices. Mill buying is limited, which tends to hold quotations where they are.

• **Cleveland** — Continued sluggish steelmaking operations are not conducive to optimism in the scrap market. Prices are nominally unchanged at the higher levels recently attained, but there isn't much in the way of buying support. Auto list tonnage will be smaller this month. However, talk of a $1 per ton reduction when February mill orders come out is heard in Youngstown.

• **Detroit**—Only minor activity is noted in the market as brokers and dealers await monthend auto lists. It's expected that auto lists may be smaller—off at least 10 per cent.

• **Buffalo**—Small purchases (mostly No. 2 bundles, No. 2 heavy melting, and short shoveling turnings) have been made by district mills.

• **Cincinnati**—Dealers and brokers are marking time pending the outcome of bids at monthend on the automotive lists. Indications are bids will be about the same, or down slightly from those submitted a month ago.

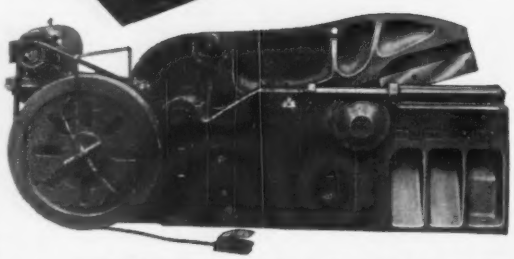
• **Birmingham** — Prices are unchanged, with demand slow and little tonnage moving to consumers.

• **St. Louis**—Little scrap is being purchased by local mills, but brokers are paying more for material. No. 1 cupola cast is up $2 to $38, and railroad specialties are up $4.50. Dealers are hoping to get into the export market by late February. Lower barge rates to the Gulf will be in effect then.

• **Houston** — Prices on several grades have been adjusted upward despite continued slow domestic de-

"CANTON"

Alligator Shears



For production cutting of bars, flats, rounds, angles, etc. Available with air operated stop motion clutch, hold down, length gauge and special grooved knives. "CANTON" shears are complete self contained units requiring no foundation. Low cost operation and minimum maintenance are proven features. Made in a complete range of sizes and models for every shearing need.

The HILL ACME Company
"CANTON" DIVISION 1201 West 65th St. CLEVELAND 2, OHIO

Bulletin S60 gives details.

If

METALWORKING PLANTS ARE YOUR PROSPECTS...

✔ **STEEL can put you in touch with the important ones, those that do more than 92% of the industry's business. Tell the buyers and specifiers in these plants of the machines or materials you have for sale through an "Equipment—Materials" advertisement. For rates write STEEL, Penton Building, Cleveland 13, O.**

mand. The export market is active and is providing support to prices. No. 1 heavy melting (domestic) is quoted $32-$33. For export, that grade is quoted $34-$35. Scrap intake at yards is improving.

• **Los Angeles**—Both domestic and export price lists are firm. Increased activity at district mills leads some scrap dealers to think domestic sales will pick up soon.

• **New York** — Brokers' buying prices are steady. Domestic demand continues slow, but export buying is well sustained, and the flow of scrap has been hampered somewhat by the weather. Stainless scrap prices are a little stronger, with quotations of $70-$75 on 18-8 borings and turnings no longer nominal.

• **San Francisco**—Except for exports, the market is expected to continue in a rut for another six weeks or so—when dealers think domestic demand will pick up a little.

• **Seattle**—Prices may be revised upward at the end of the month. But mills are buying sparingly, and order volume is up only a little.

Scrap Use Slips, but Tops Consumption of Pig Iron

Consumption of ferrous scrap in November (1960) dropped 10 per cent from that in the preceding month due to the shorter month and a 7 per cent decrease in daily use, reports the U. S. Bureau of Mines. The total was 3,940,000 gross tons vs. 4,375,871 in October. Pig iron use in the month was 3,675,000 tons vs. 4,017,000 in October. Of the total metallic charge during November, 52 per cent was scrap and 48 per cent pig iron.

Domestic consumers' stocks of scrap on Nov. 30 totaled 8,458,000 tons, slightly less than the 8,493,946 tons held at the end of October. Stocks of pig iron were 3,313,000 tons, up 1 per cent from the 3,267,072 tons at the end of October.

Distributors . . .

Prices, Page 141

Revisions in distributors' price schedules have been gradually working eastward, but they have not yet reached the Philadelphia district. Service centers are watching developments.

Steel imports into Houston rose to 35,000 tons in December, the highest tonnage since last May. The November, 1960, total was 28,000 tons; December, 1959, 45,000. Most cargoes are offered by foreign dealers on the basis of three or four months delivery.

Pig Iron . . .

Pig Iron Prices, Page 141

Merchant pig iron business is slow, plagued by spotty foundry demand. The sluggish foundry melt is due in part to severe weather conditions. Pig iron producers are operating at greatly reduced rates, in some instances serving customers from inventory.

In the Pacific Northwest, potential demand for cast iron pipe is reported as being impressive, but bids for some projects await allocation of municipal funds. Price cutting continues on merchant iron in the Los Angeles market.

Blast Furnaces Increase Production During 1960

Blast furnace production (pig iron and ferroalloys) last year totaled 67,320,129 tons vs. 60,774,738 in 1959, reports the American Iron & Steel Institute. Of the total output, 608,240 tons were ferroalloys vs. 452,312 tons in 1959.

December production was 3,876,776 tons (35,617 ferroalloys) compared with 4,174,865 in November, 1960, and 7,638,359 in December, 1959. Production by states in December and all of 1960:

Blast Furnace Production—1960
(Net tons; Pig Iron and Ferroalloys)

	December	1960	1959
Mass., New York	227,350	4,266,683	3,711,880
Pennsylvania	994,727	17,041,918	15,500,696
Md., Va., W. Va.	366,168	6,369,016	5,771,916
Ky., Tenn., Texas	83,555	1,669,232	1,451,166
Alabama	264,952	3,588,867	3,684,868
Ohio	581,611	11,957,874	11,693,985
Indiana	497,981	8,403,794	6,575,694
Illinois	297,465	5,307,083	5,268,443
Mich., Minn.	281,894	4,980,925	4,048,853
Colo., Utah, Calif.	281,073	3,734,737	3,067,237
Total	3,876,776*	67,320,129‡	60,774,738†

*Includes 35,617 tons of ferroalloys.
‡Includes 608,240 tons of ferroalloys.
†Includes 452,312 tons of ferroalloys.
Data from American Iron & Steel Institute.

Tool Steel . . .

Tool Steel Prices, Page 140

Reduction in standard stock sizes of flat, ground tool steel stock by 53 per cent is proposed by the Office of Technical Services, U. S. Department of Commerce. If industry approves, a recommendation will be issued. The American Ground Stock Association favors the move, but compliance by manufacturers will be voluntary.

Rails, Cars . . .

Track Material Prices, Page 139

Domestic freight car orders dipped in December, 1960, totaling 2705 units vs. 3680 in November,

(*Please turn to Page* 151)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Jan. 25, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Jan. 25	$32.00
Jan. 18	32.00*
Dec. Avg.	28.92
Jan. 1960	41.92
Jan. 1956	52.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

*Revised.

PITTSBURGH

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00
No. 1 dealer bundles	29.00-30.00
No. 2 bundles	23.00-24.00
No. 1 busheling	29.00-30.00
No. 1 factory bundles	36.00-37.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	33.00-34.00
3 ft and under	32.00-33.00
Heavy turnings	25.00-26.00
Punchings & plate scrap	36.00-37.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	31.00-32.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	31.00-32.00
Drop broken machinery	44.00-45.00§

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
Rails, 2 ft and under	47.00-48.00
Rails, 18 in. and under	48.00-49.00
Random rails	41.00-42.00
Angles, splice bars	37.00-38.00
Railroad specialties	*43.00-44.00*
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	30.00-32.00
No. 1 hvy melt., dealer	29.00-30.00
No. 2 hvy melting	26.00-27.00
No. 1 factory bundles	34.00-35.00
No. 1 dealer bundles	29.00-30.00
No. 2 bundles	19.00-20.00
No. 1 busheling, indus.	30.00-32.00
No. 1 busheling, dealer	29.00-30.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	16.00-17.00
Shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut structurals, 3 ft	33.00-34.00
Punchings & plate scrap	35.00-36.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	33.00-34.00
Unstripped motor blocks	31.00-32.00
Clean auto cast	44.00-45.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	*31.00-32.00*
R.R. malleable	43.00-44.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	46.00-47.00
Angles, splice bars	40.00-41.00
Axles	53.00-55.00
Rails, rerolling	54.00-55.00

Stainless Steel Scrap

18-8 bundles, solids	165.00-175.00
18-8 turnings	90.00-95.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	20.00-21.00
No. 2 heavy melting	15.00-16.00
No. 1 bundles	22.00-23.00
No. 2 bundles	12.00-13.00
No. 1 busheling	19.00-20.00
Machine shop turnings	6.00-7.00
Mixed borings, turnings	7.00-8.00
Shovel turnings	8.00-9.00

Cast Iron Grades

No. 1 cupola	29.00-30.00
Stove plate	23.00-24.00
Heavy breakable	22.00-23.00
Unstripped motor blocks	18.00-19.00
Charging box cast	24.00-25.00
Clean auto cast	35.00-36.00

CLEVELAND

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	34.00-35.00
No. 1 bundles	28.50-29.50
No. 2 bundles	16.00-17.00
No. 1 busheling	29.00-30.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	31.00-32.00
Cut structurals, plate, 2 ft and under	36.00-37.00
Low phos. punchings & plate	28.00-29.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	28.00-29.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	29.00-30.00
Brake shoes	35.00-36.00
Clean auto cast	43.00-44.00
Burnt cast	30.00-31.00
Drop broken machinery	44.00-45.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	49.00-50.00
Rails, random lengths	41.00-42.00
Cast steel	38.00-39.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	42.50-43.50
Angles, splice bars	40.50-41.50
Rails, rerolling	53.00-54.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	150.00-155.00
18-8 turnings	65.00-70.00
430 clips, bundles, solids	65.00-70.00
430 turnings	10.00-20.00

YOUNGSTOWN

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	32.00-33.00
No. 1 bundles	32.00-33.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	33.00-34.00
Electric furnace bundles	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	27.00-28.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plates, 2 ft and under	37.00-38.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	40.00-41.00
Rails, 3 ft and under	46.00-47.00
Rails, rerolling	54.00-55.00
Railroad specialties	39.00-40.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	24.50-25.50
No. 2 heavy melting	22.50-23.50
No. 1 bundles	25.50-26.50
No. 2 bundles	17.00-18.00
No. 1 busheling	24.50-25.50
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	11.00-12.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	33.00-34.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Heavy breakable cast	28.00-29.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.00-30.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	37.00-38.00

PHILADELPHIA

No. 1 heavy melting	36.00
No. 2 heavy melting	32.00
No. 1 bundles	38.00
No. 2 bundles	23.00
No. 1 busheling	37.00
Electric furnace bundles	38.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00†
Machine shop turnings	13.00†
Heavy turnings	25.00†
Structurals & plates	38.00-41.00
Couplers, springs, wheels	*41.00*
Rail crops, 2 ft & under	*48.00-50.00*

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	39.00
Drop broken machinery	48.00-49.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	27.00-28.00
No. 2 bundles	16.00-17.00
Machine shop turnings	3.50-4.00†
Mixed borings, turnings	4.00-4.50†
Shovel turnings	5.00-6.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	140.00-145.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	50.00-55.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	33.00-34.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	36.00-37.00
Structurals & plate	36.00-37.00
Electric furnace bundles	34.00-35.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	33.00-34.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	37.00-38.00
Angles, splice bars	36.00-37.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	19.00
No. 1 busheling	28.00
Machine shop turnings	8.00
Shovel turnings	10.00

Cast Iron Grades

No. 1 cupola	*38.00*
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	41.00
Stove plate	35.00

Railroad Scrap

No. 1 R.R. heavy melt.	31.00
Rails, random lengths	37.00
Rails, rerolling	49.00
Rails, 18 in. and under	43.00
Angles, splice bars	*38.00*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	29.00
No. 1 bundles	34.00
No. 2 bundles	*20.00-21.00*
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	*35.00*
2 ft and under	*37.00-38.00*

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Heavy breakable	24.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	*30.00-31.00*

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	30.00
No. 1 hvy melt (export)	*35.00**
No. 2 heavy melting	26.00
No. 2 hvy melt (export)	*31.00**
No. 1 bundles	25.00
No. 2 bundles	17.00
No. 2 bundles (export)	*23.00**
Machine shop turnings	12.00
Shovel turnings	12.00
Cast iron borings	12.00
Cut structurals and plate 1 ft and under	41.00

Cast Iron Grades

No. 1 cupola	40.00-41.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-36.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	34.00
No. 2 hvy (unprepared)	30.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	24.00
No. 2 hvy melt, 2 ft & under	22.50
No. 1 bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	23.00
Unprepared	18.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	30.00

*Includes $4 dock charge.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Try it. No matter how strong you are you can't kink TUFFY by hand. When improperly used, TUFFY can kink. But it straightens easily with no material damage to the fabric. Patented construction gives TUFFY muscles of braided steel—assures rugged performance, greater safety, longer life. Union Tuffy Slings and Hoist Lines are balanced, tough-job team-mates. Always pair 'em up for better service.

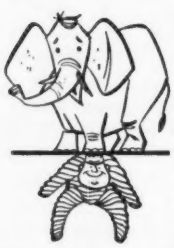
Any task with loads to lift, lower or pull is a job for Union Tuffy Slings and Hoist Lines. And because sling and hoist jobs vary all over the lot, Union Wire Rope engineers specialize in tailoring TUFFY products to specific uses. You are invited to ask for this service—no extra charge.

4 New Union Slings

In addition to famed Tuffy Slings, Union Wire Rope offers in a full range of sizes:

1. **Hand Braided** six and eight part slings.
2. **Uni-ply** — a flexible multi-part rope laid sling with pressed-on metal ferrule.
3. **Press-Grip** wire rope sling with pressed-on metal ferrule.
4. **Uni-Grip** wire rope sling with return loop splice and pressed-on metal ferrule.

Union Wire Rope Tuffy Tips on safe use of Slings and Hoist Lines



How Much Lifting Should Be Done by Muscles?

The U. S. Dept. of labor recommends men should handle no more than 50 pounds; women no more than 25 pounds. This is for people of average size and weight, in normal physical condition. Mechanical hoisting equipment should be used for all loads not comfortably lifted by muscles.

Free! Two Valuable Tuffy Handbooks!

Both free. Write for these 2 great Tuffy Service Manuals:

1. "Tuffy Tips" with more than a score of safety hints like the one shown here. Clever, helpful illustrations.
2. "Tuffy Sling Handbook" All about selection and use of slings—types, dimensions, weights, fittings, rated loads, safety-approved signals.

WRITE Union Wire Rope, Armco Steel Corporation, 2160 Manchester Ave., Kansas City 26, Missouri

ARMCO Union Wire Rope

Copper Producers Trim Output

Nonferrous Metal Prices, Pages 150 & 151

COPPER PRODUCERS have taken a major step to limit the amount of excess metal overhanging world markets.

Metalmen have been saying for six weeks that the only action that could put a little stability into the market would be a substantial production curtailment. Pressures for even deeper cutbacks intensified earlier this month when the primary price fell 1 cent to 29 cents a pound.

Then alarm bells began to ring! Anaconda Co. announced it was cutting back both U. S. and Chilean production by 10 per cent, or about 4500 tons a month. Kennecott Copper Corp. cut the workweek at its U. S. facilities from seven to six days, a curtailment of about 13 per cent, or 4500 tons a month. Inspiration Consolidated Copper Corp. reduced operations by 10 per cent, or 400 tons a month. Cerro Corp. cut output by 10 per cent, a 200 ton a month reduction. Southern Peru Copper Co. announced its output rate had been cut 15 per cent, or 2100 tons a month, at the first of the year.

Since Jan. 1, Free World copper output has been slashed by 11,700 tons a month, or 140,400 tons a year. Last year, cutbacks were announced by Phelps Dodge Corp. in the U. S., three African producers, and one Canadian company. Together, with the most recent announcements, the curtailments add up to about 22,000 tons a month, or 264,000 tons a year.

Meanwhile, the copper price appears a little firmer although sales remain slow. The consensus: If more cutbacks are needed, the producers will make them.

New Aluminum Company?

For the past year, rumors that this or that company would build primary aluminum facilities have been widespread. Most have been discounted.

Cerro Corp. looks like the hottest prospect in a long time. Here's why: Earlier this month, the company announced plans for the acquisition of Union Pacific Aluminum Co., Los Angeles fabricator of bright and enameled aluminum sheet coil stock.

Last year, a United spokesman told STEEL that his company would enter the production of primary aluminum by building a 20,000 ton a year reduction plant at Longview, Wash. United took option on land near Longview and obtained a power allocation from the Bonneville Power Authority. The puzzling question was how a relatively small firm ($7.6 million sales last year) could finance a primary facility even though it had access to the cheapest source of hydroelectric power in the U. S.

The situation changes when Cerro, a multidivision, multimillion dollar, metal producing and fabricating firm, enters the picture. Through its Fairmont Aluminum Co. Div., it owns a fabricating plant with a yearly capacity of 30,000 tons of sheets and sheet products. Cerro recently joined with three other companies in a venture to construct a 100,000-ton-a-year rolling mill.

Significantly, Cerro does not deny rumors it may expand into primary aluminum. Its recent history of expansion and the fact a reduction plant at Longview would be relatively inexpensive lend credence to the speculations.

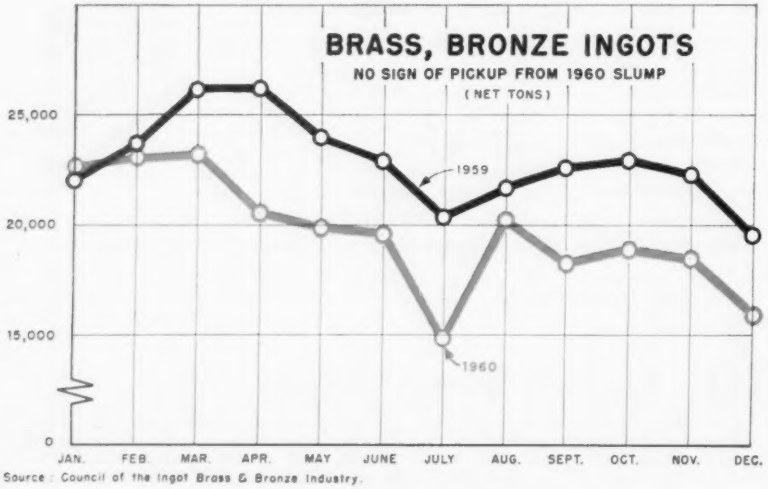
Asarco Hit by Suit

American Smelting & Refining Co. is the latest nonferrous company to be slapped with an antitrust suit by the Justice Department (suits already are pending against Alcoa and Kennecott). Justice charges that Asarco's stock ownership in Revere Copper & Brass Inc. and General Cable Co. serves to lessen competition in violation of the Clayton Act. The suit asks that Asarco be forced to give up the holdings.

Asarco owns about 35 per cent of the voting stock in Revere and 30 per cent in General Cable—and has for about 30 years. In 1959, Asarco sold $12.8 million in raw materials to Revere and $11.2 million worth to General Cable.

Rumors have it the government will build its case on minority control of the two fabricating companies by Asarco. Asarco has made no official announcement of its plans, but metalmen are sure it will fight.

The government's suit also asks that General Cable be ordered to divest itself of holdings in nine wire and cable companies.



Source: Council of the Ingot Brass & Bronze Industry.

MAY, 1959—MERGER OF MEXICO REFRACTORIES COMPANY brings into Kaiser Refractories one of the nation's finest ranges of fireclay and silica brick, plus famous Mex-R-Co specialties.

FEBRUARY, 1960—KAISER TAR-BONDED DOLOMITE BRICK sets new production record in basic oxygen furnace—30,625 tons in 277 heats. Brick resists hydration in storage

APRIL, 1960—NEW PERICLASE PLANT, Midland, Michigan, with capacity of 45,000 tons, increases Kaiser Refractories' annual capacity to 165,000 tons of high-purity MgO furnace grains.

AUGUST, 1960—NEW TECHNICAL CENTER under construction at Mexico, Missouri, augments application research and technical services of Research Laboratory at Milpitas, California.

OCTOBER, 1960—NEW BRICK FACILITIES under construction at Columbiana, Ohio, to make tar-bonded refractories for the basic oxygen steel process, supplements Moss Landing, Cal. plant.

IN 1961 GET THE PROFITABLE ANSWER FROM KAISER REFRACTORIES

Ask for proof of performance. Ask for virtually any refractory material. Ask Kaiser Refractories . . . and you'll get this year's most up-to-date, profitable answer!

There are two reasons why. First, your Kaiser Refractories Sales Engineer probably has recent data about a case similar to yours, gathered by trained technical people. Second, Kaiser Refractories' growing variety of materials, brick, castables and specialties provides the finest choice in the industry today.

For information, contact Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc. (Canadian Subsidiary: Refractories Engineering & Supplies, Ltd.)

PITTSBURGH 22, PA. . . . . 3 Gateway Center
MEXICO, MISSOURI . . . . . Mex-R-Co Building
OAKLAND 12, CALIF. . . . . 300 Lakeside Drive

KAISER REFRACTORIES

HIGH ALUMINA, FIRECLAY, GRAPHITE AND SILICA REFRACTORIES, PERICLASE BRICK, MORTARS, GRAINS, AND RAMMING MIXES

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,0000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.
Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intristic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, N. York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. Ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l, 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 100.50; prompt, 100.375.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 27.25; tin bronze, No. 225, 37.00; No. 245, 31.50; high-leaded tin bronze, No. 305, 31.75; No. 1 yellow, No. 405, 22.75; manganese bronze, No. 421, 26.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C. R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.60	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 21.25-21.75; No. 2 heavy copper and wire, 19.25-19.75; light copper, 16.50-17.00; No. 1 composition red brass, 17.25-17.75; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	54.13b	51.36c	....	55.32
Yellow Brass	48.10	33.71d	48.39	52.36
Low Brass, 80%	50.65	50.50	50.94	54.71
Red Brass, 85%	51.54	51.48	51.83	55.40
Com. Bronze, 90%	52.98	52.92	53.27	56.79
Manganese Bronze	56.60	50.20	....	....
Muntz Metal	50.94	46.25	60.47	....
Naval Brass	52.86	46.67	59.17	57.02
Silicon Bronze	59.47	58.66	58.76	77.90
Nickel Silver, 10%	63.66	65.99	65.74	....
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52

SCRAP ALLOWANCES e

(Based on copper at 29.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	25.000	25.000	24.250
Yellow Brass	21.500	18.375	17.375
Low Brass, 80%	21.375	21.125	20.625
Red Brass, 85%	22.250	22.000	21.500
Com. Bronze, 90%	23.000	22.750	22.250
Manganese Bronze	18.000	17.750	17.250
Muntz Metal	18.125	17.875	17.375
Naval Brass	18.000	17.750	17.250
Silicon Bronze	24.500	24.250	23.500
Nickel Silver, 10%	24.125	23.875	12.062
Phos. Bronze, A-5%	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 16.25-16.75; new brass clippings, 14.50-15.00; light brass, 11.50-12.00; heavy yellow brass, 12.50-13.00; new brass rod ends, 13.50-14.00; auto radiators, unsweated, 13.00-13.50; cocks and faucets, 14.25-14.75; brass pipe, 14.75-15.25.

Lead: Soft scrap lead, 6.75-7.25; battery plates, 2.00-2.25; linotype and stereotype, 8.00-8.50; electrotype, 7.00-7.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 23.00-24.00; old sheets, 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 2.50-2.75; new diecast scrap, 3.00-3.50; old diecast scrap, 2.00-2.50.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 23.75; No. 2 heavy copper and wire, 22.25; light copper, 20.00; refinery brass (60% copper) dry copper content, 20.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.75; No. 2 heavy copper and wire, 22.25; light copper, 20.00; No. 1 composition borings, 19.00; No. 1 composition solids, 19.75; heavy yellow brass solids, 15.00; yellow brass turnings, 13.00; radiators, 16.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50. 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 119.50; 200-499 lb, 118.00; 500-999 lb, 117.50; 1000 lb or more, 117.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats, 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.10; 100-600 lb, 69.70; 700-1900 lb, 67.00; 2000-9900 lb, 65.10; 10,000 lb or more, 63.80.

Stannous Chloride (Anhydrous): 25 lb, 154.40; 100 lb, 149.50; 400 lb, 147.10; 800-19,900 lb, 106.20; 20,000 lb or more, 100.10.

Stannous Sulphate: Less than 50 lb, 139.60; 50 lb, 109.60; 100-1900 lb, 107.60; 2000 lb or more, 105.60.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 145)

1960, and 10,555 in December, 1959, reports the American Railway Car Institute and the Association of American Railroads. Orders in all of 1960 were 36,368 cars vs. 56,489 in the preceding year.

Cars on order and undelivered as of Jan. 1 this year totaled 21,070. The figure compared with 22,781 on Dec. 1, 1960, and with 43,870 on Jan. 1, 1960.

Deliveries in December, 1960, involved 4272 cars vs. 2799 in November. Deliveries in all of 1960 totaled 57,047 cars vs. 37,819 in 1959.

Structural Shapes . . .

Structural Shape Prices, Page 134

Considering that this is the off-season for construction, structural steel demand is encouraging. A fair volume of orders is being placed with the fabricators, and there is considerable work on drawing boards. Most fabricators have at least two months' work on hand, enough to carry them until spring. There are some exceptions—principally smaller shops.

Structural shape deliveries range one to four weeks, depending on mill rolling schedules. The quick deliveries lessen the need for heavy stockpiling by fabricators. Many of them are pacing their steel placements with receipt of new orders.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

19,400 tons, 43 story office building, 1290 Avenue of the Americas, New York, through Uris Buildings Corp., to Harris Structural Steel Co., New York.

3000 tons, state highway bridges and a viaduct, Utica, N. Y., through E. W. Winkelman Co. Inc., Syracuse, N. Y., general contractor, to Ernst Steel Corp., Buffalo; also, 1500 tons of reinforcing bars to Republic Steel Corp., Cleveland.

2775 tons, state highway bridges, FISH 6-13, Monroe County, New York, to Ernst Iron

CLASSIFIED ADVERTISING

Help Wanted

General Sales Manager

For Leading Eastern Steel Distributor

REQUIREMENTS:

(1) At least 3 years experience as sales manager or assistant sales manager—industrial metal product sales

(2) Proven leadership in training and directing salesmen and representatives

(3) Ability to plan sales objectives and take appropriate action to insure fulfillment

BENEFITS:

- Salary commensurate with experience
- Share of company profits
- Car and expenses
- All company paid benefits

Reply giving full history and salary requirements.
Box #899, STEEL, Penton Bldg., Cleveland 13, Ohio.

PROCESS ENGINEER

To work on development and research projects in investment casting foundry. Applicant should have experience in this field and educational background of chemistry and/or metallurgy. Send application with complete resume.

Casting Engineers
2323 North Bosworth Ave., Chicago 14, Ill.

ENGINEERS DESIGNERS

McKee offers permanent career opportunities to individuals qualified by experience to undertake the design of:

Steel Plants — Refineries
Sintering Plants — Chemical Plants
Pelletizing plants — Petro-Chem Plants

Remuneration commensurate with experience and ability.

Reply in confidence to:
G. VICTOR HOPKINS
ARTHUR G. McKEE & COMPANY
2300 Chester Ave. • Cleveland 1, O.

Help Wanted

SALESMAN TO COVER CHICAGO TERRITORY selling mill and heavy industrial overhead traveling cranes. Respond to Box 893, STEEL, Penton Bldg., Cleveland 13, Ohio.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind.

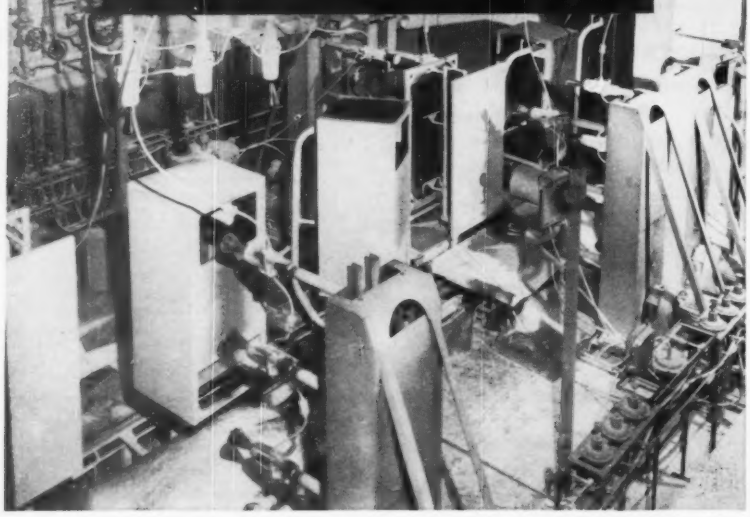
Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry. When you have an opportunity to offer, use the Help Wanted columns of STEEL.

NEW

RANSBURG

MOVING BELLS

increase paint mileage
... improve quality on
KELVINATOR REFRIGERATORS



Ransburg's No. 2 Process moving bells—latest innovation in electrostatic painting—automatically paint mixed sizes of refrigerator cabinets and doors on Kelvinator's new finishing line.

On this job—first of its kind—limit switches re-position the reciprocating bells to accommodate various model sizes mixed on the same line. And, electric eyes selectively trigger the paint on and off between parts.

RESULTS? Automatic electrostatic spray painting—which replaced a battery of reciprocating automatic air guns—is providing Kelvinator with a beautiful, higher quality, and more uniform finish. Rejects, formerly a troublesome problem, have been practically eliminated. And, along with appreciable labor savings in this highly automated set-up, paint mileage is substantially improved . . . even bettering the savings indicated in pre-installation lab tests at Ransburg.

Like Kelvinator, other manufacturers of quality products will find Ransburg's moving bells the automation answer for production lines where batching of similar parts is impractical.

NO REASON WHY YOU CAN'T DO IT, TOO!

Want to know how Ransburg No. 2 Process can improve the quality of YOUR painted products—and at the same time—cut YOUR paint and labor costs? Write for our No. 2 Process brochure. Or, if your production doesn't justify automatic painting, let us tell you about the No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized, or non-conveyorized painting.

RANSBURG

RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

Works, Buffalo; Lane Construction Co., Meriden, Conn., general contractor.

1400 tons, Boeing Airplane plant addition, Seattle, to Isaacson Iron Works, Seattle; the Austin Co., Seattle, general contractor.

930 tons, post office, Harrisburg, Pa., through McCloskey & Co., Philadelphia, general contractor, to Barber & Ross, Washington.

800 tons, second Lake Washington floating bridge, Seattle, to Pacific Car & Foundry Co., Seattle; Guy F. Atkinson Co., San Francisco, general contractor.

715 tons, state highway bridges, FARC 60-121, Broome County, New York, to City Iron Works, Wethersfield, Conn.; Savin Bros. Construction Co., Wethersfield, general contractor.

415 tons, reinforcing bars also required, radar tower, Malstrom Air Base, Montana, to Empire Steel Co., Salt Lake City, Utah.

175 tons, building, express facilities, Harrisburg, Pa., to Dauphin Steel & Engineering Co., a district fabricator.

100 tons, intake bulkheads, trashracks and lifting beam, Oahe Reservoir project, near Pierre, S. Dak., to Lakeside Bridge & Steel Co., Milwaukee.

STRUCTURAL STEEL PENDING

1800 tons, plant addition, Boeing Airplane Co., Seattle; bids in.

1752 tons, 11 bridge structures, Southington, Conn.; bids Jan. 23, Hartford, Conn.; also, 1341 tons concrete reinforcing bars; 635 tons, mat reinforcement, and 185 tons, steel piling.

1450 tons, eight bridge structures and highway, Rocky Hill-Wethersfield, Conn.; White Oak Excavators Inc., Plainville, Conn., low on the general contract; also, 1150 tons, concrete reinforcing bars; 570 tons, mat reinforcement, and 305 tons of steel piles.

1183 tons, state bridgework, Delaware County, Pennsylvania; bids Feb. 17.

1122 tons, transmission line footings, 42.3 miles of Oregon 345 kv line, involving 94 towers, also 220 tons of reinforcing bars; materials to be government furnished; bids to Bonneville Power Administration, Portland, Oreg., Jan. 27.

1054 tons, 345-kv transmission line in Oregon involving 90 towers; also 250 tons of leg extensions and specials; bids to Bonneville Power Administration, Portland, Oreg., Feb. 14; materials to be government-furnished.

900 tons, Oregon State overcrossing, Multnomah County; bids to Salem, Oreg., Jan. 24.

872 tons, state bridgework, Allegheny County, Pennsylvania; bids Feb. 17.

770 tons, transmission towers, Chugack Electric Association, Anchorage, Alaska.

735 tons, eight span stringer bridge, including fender system, Lubec, Maine-Campobello Island, New Brunswick; Callahan Bros. Inc., Mechanic Falls, Maine, general contractor; also required, 135 tons of concrete reinforcing bars.

690 tons, wide flange, Navy General Stores Supply Office, Philadelphia; bids in.

665 tons, state bridges, PFC 18537 Albany County, New York; Coleman Bros. Corp., Readville, Mass., is low on the general contract.

234 tons, 350 ft, four span bridge and highway structure, Ammo Dump Road, Bangor, Maine; bids Jan. 18, to Augusta, Maine; also, 78 tons of reinforcing bars.

200 tons, bulkhead gates, lifting frame and guides, Trinity River Division, Central Valley project; bids Jan. 20 to the U. S. Bureau of Reclamation, Denver.

135 tons, also 70 tons of reinforcing steel, conversion of Copper River Bridge, Alaska; Cole & Paddock, Juneau, Alaska, low at $299,933 to the Alaska Department of Public Works, Juneau, on rebids.

100 tons or more, steel frame addition to reactor building, Hanford Works; bids to Kaiser Engineers, prime contractor, Richland, Wash., Jan. 25.

PLATES . . .

PLATES PLACED

973 tons, alloy, grade Hy-80, supply officer, Naval Shipyard, Portsmouth, N. H., to U. S. Steel Corp., Pittsburgh; also, 295 tons of steel extrusions, same grade to Metals Processing Div., Curtiss-Wright Corp., Buffalo.

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Coming

Feb. 6

IN

STEEL

Quarterly Survey of Metals

The first in 1961 appears next week. STEEL has been reporting inventory and buying practices in metalworking in this meaningful and useful form since 1952. The surveys appear in the first issues of February, May, August, and November each year.

They help you by pointing out:

1. Present inventory levels by major product groups.
2. Inventory shifts in the preceding quarter.
3. Buying plans of purchasing agents for the coming quarter.
4. What products are overstocked.
5. What products are causing delivery problems.

This series is a companion to similar reports on inventory and buying practices for components. Those appear in the first issues of January, April, July, and October.

Famous BUTLER building panels formed from BONDERIZED, color-coated hot-dip galvanized coil

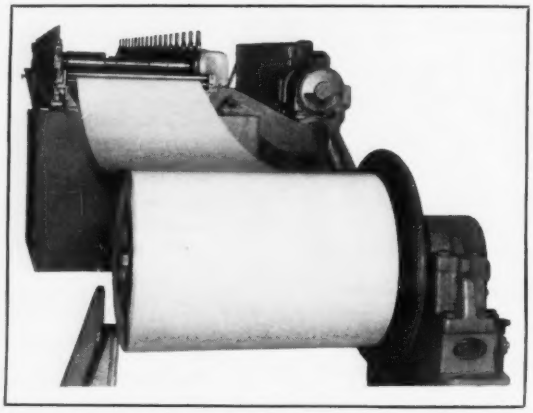
Butler Manufacturing Company building panels, Bonderite-treated and with baked-on finish, are easily and quickly erected.

BUTLER PANELS LOOK BETTER LONGER! Those attractive Butler buildings, with their strong ribbed panels and handsome colors, will retain their appearance through many years of weather and hard service.

Butler panels are formed from Bonderized, pre-finished hot dip galvanized stock. This combines the corrosion-resistance of hot dip galvanized with the advantages of baked-on finish, over Bonderite, to produce panels with vastly increased durability.

Bonderite is the key to the superior adhesion which allows forming *after* paint coating, without damage to the finish on Butler panels. Bonderite produces a close, small-grained, nonmetallic crystalline coating integral with the metal itself—a perfect base for any finish.

For the finest, most durable protective finish on your product, make the choice that quality manufacturers like Butler have made. Insist on Bonderite under the finish!



A coil of Bonderized, pre-finished galvanized steel feeds into roll former at a Butler plant.

PROTECTED BY Bonderite PARKER RUST PROOF CO. QUALITY CORROSION RESISTANT

Parker Rust Proof Company
2158 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

Since 1914—Leader in the field

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

How Empire-Reeves gets better quality steels...faster

Lee Wilson open coil annealing improves uniformity, facilitates delivery, reduces inventory at Empire-Reeves

"Improved customer service," reports Donald W. Frease, President of Empire-Reeves Steel Corporation," is just one of the assets the addition of the Lee Wilson Open Coil Annealing has given Empire."

"We can now process orders with much greater speed," he continues, "yet we can reduce our inventory in the annealing department, because—by opening the coil—hot gases can saturate the entire coil in a fraction of the time previously required. Cool-down is just as efficient.

"The quality of our product is improved because the heat quickly reaches every square inch of the surface of the steel coil. This means it receives a perfectly uniform anneal with an absolute minimum of hardness variation. Because we are handling individual coils instead of continuous strip we have wonderful flexibility. We can process short orders as easily as long runs.

"The Lee Wilson Open Coil Process thus enables us to improve our customer service and our product, and at the same time, gives us the most efficient annealing system available today," Mr. Frease concludes.

If a better product or more efficient annealing department appeals to you, why not get the last word on annealing practice. The Lee Wilson sales engineer in your area will be happy to meet with you at your convenience.

Donald W. Frease, President of Empire-Reeves Steel Corporation (center), tells J. L. Whitten, Vice President of Sales of Lee Wilson (right), and E. G. Fenton of Empire, the results of Open Coil Annealing at Empire after the first few months of operation.

Overall view of the Lee Wilson Open Coil Annealing installation at Empire-Reeves' Mansfield, Ohio, plant.

Lee Wilson® ENGINEERING COMPANY, INC.

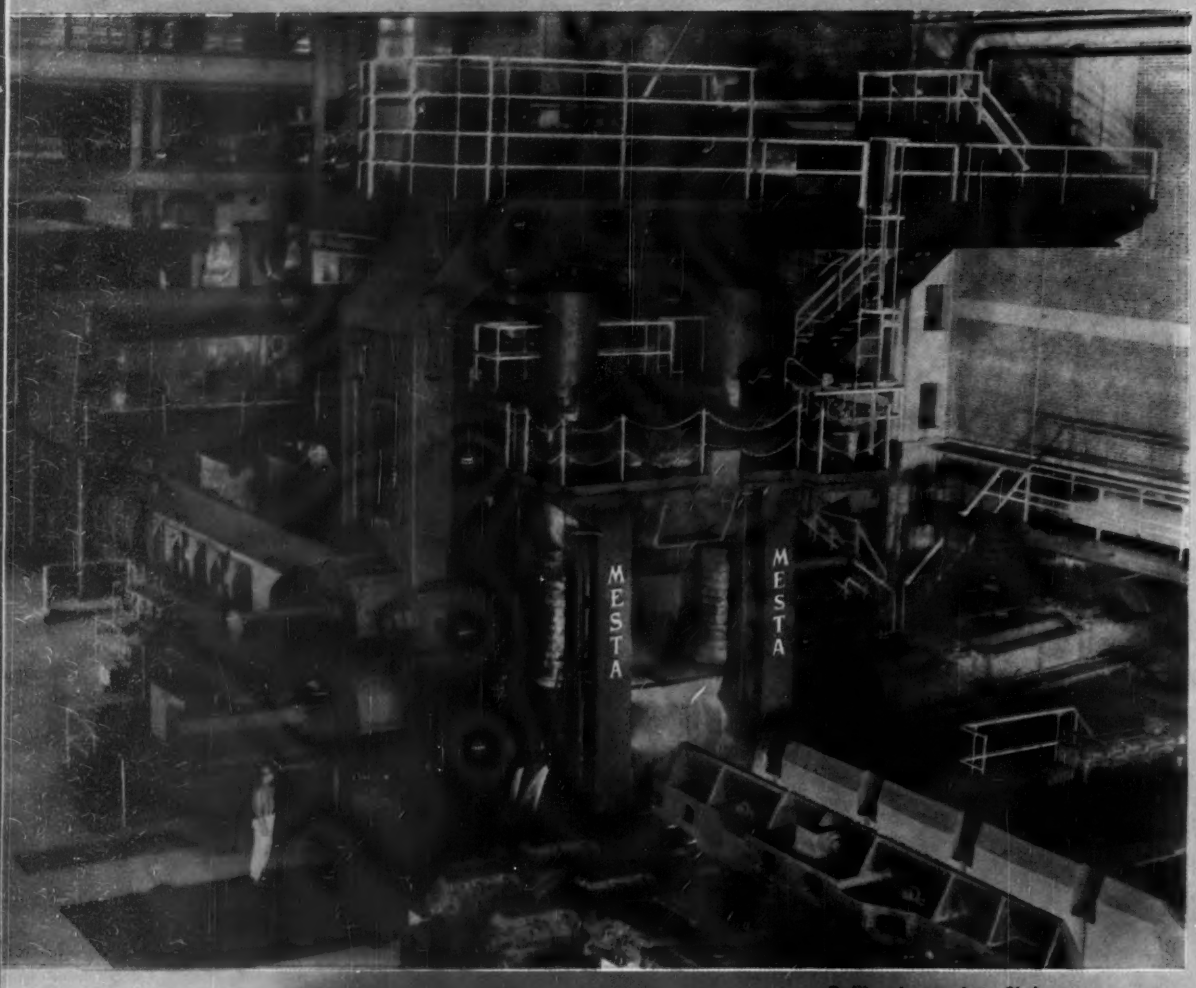
20005 LAKE ROAD • CLEVELAND 16, OHIO

HIGH PRODUCTION ANNEALING SYSTEMS

MAKE THE BEST METALS BETTER

® ORIGINATORS AND LEADING PRODUCERS OF OPEN COIL AND SINGLE STACK FURNACES

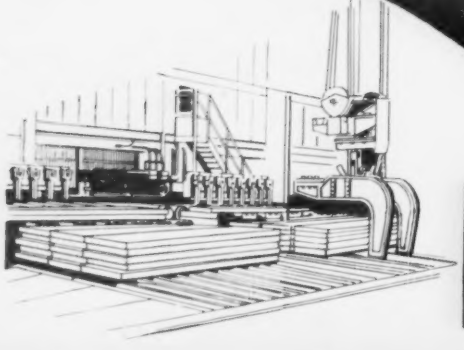
4081



Rolling Ingots into Slabs on a
MESTA Universal Reversing Slabbing Mill

SLABBING MILLS

Designed and Built by MESTA



Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA